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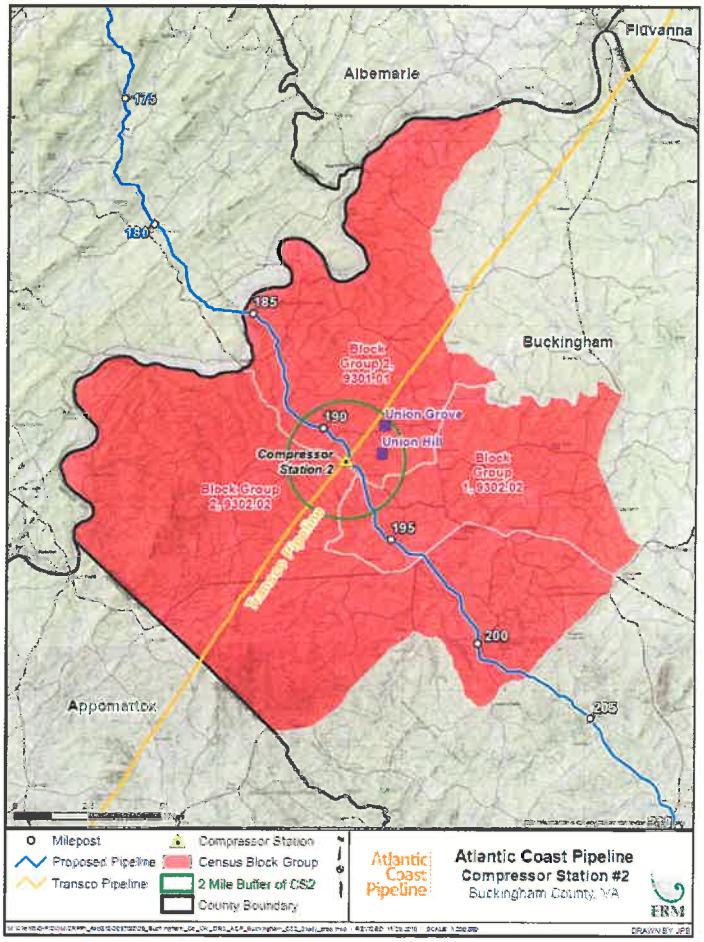
November 28, 2018

Re: Buckingham Compressor Station Alternatives Analysis

Site selection for the Buckingham Compressor Station was driven by two primary factors:

1. The first was the need to interconnect the ACP with the Transco pipeline (see interconnect location below). This interconnection allows for a reliable, regional pipeline network. Because Transco's pipeline is operated at a different pressure than the ACP, any gas exchanged between the two requires compression.
2. The second was the availability for purchase of sufficient acreage for the compressor station and its surrounding buffers. The FERC does not permit condemnation on property for the siting of a compressor station. Therefore, Atlantic was required to purchase land from a willing seller.

As part of the ACP siting and routing process, Atlantic completed an extensive alternatives analysis. Relevant portions of that analysis are attached, including Resource Report 10 (Alternatives Report submitted to FERC) and the section within the FERC's Final Environmental Impact Statement outlining their alternative analysis.



Map Showing Buckingham Compressor Station
at the Transco and ACP Interconnection Point

10.11.1.2 Compressor Station 2

Atlantic identified and evaluated two sites for Compressor Station 2. The primary site is located in Buckingham County, Virginia, approximately at MP 191.5 of the AP-1 mainline. This site is situated at the northern corner of the intersection of Highway 56 (South James River Road) and the existing Transco pipeline system in an area characterized by an immature planted pine forest. The site will have a permanent footprint of approximately 12.9 acres and an additional temporary workspace of about 56.0 acres. The alternate site, CS2 Alternate, is located approximately 1.9 miles to the southwest of the primary site. The alternate site is situated near the intersection of Midland Road and the existing Transco pipeline system in Buckingham County in an area characterized by immature forest. The alternate site would have a permanent footprint of approximately 13.1 acres and a temporary construction workspace of about 55.8 acres.

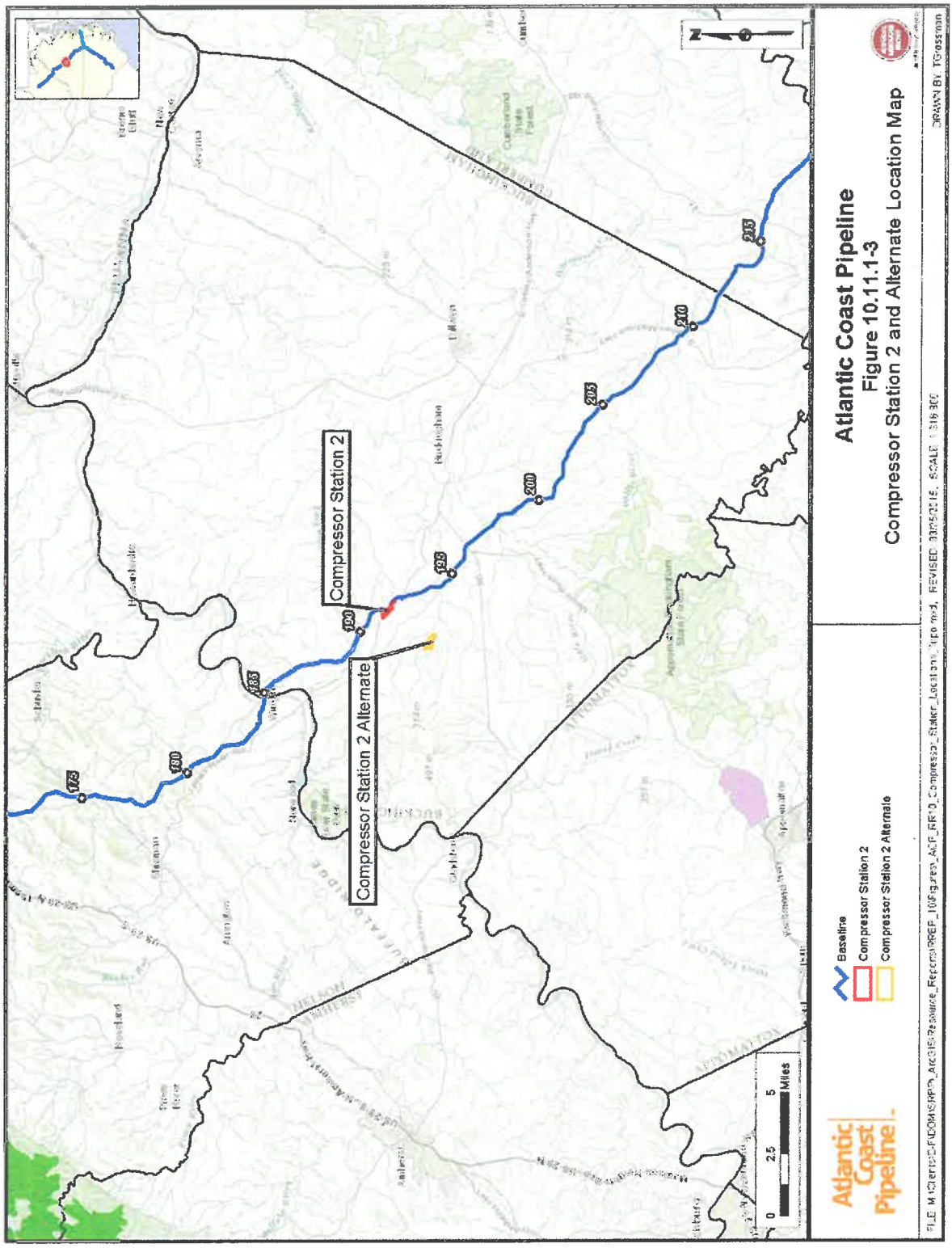
Figure 10.11.1-3 depicts the location of the primary and alternate sites. Figures 10.11.1-4 and 10.11.1-5 depict the boundaries of each site with an aerial background. Comparative environmental data on each site is provided in Table 10.11.1-1.

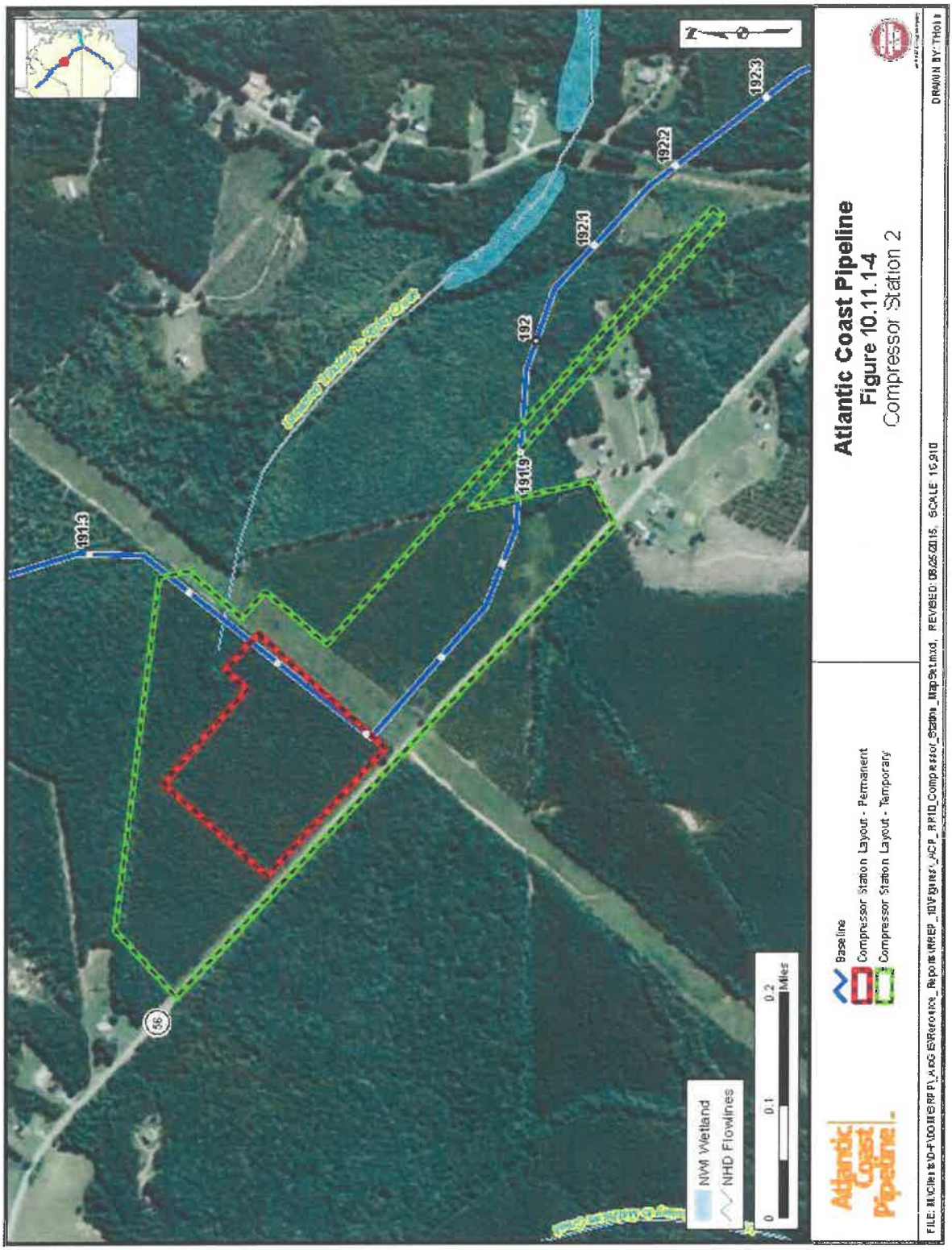
TABLE 10.11.1-1

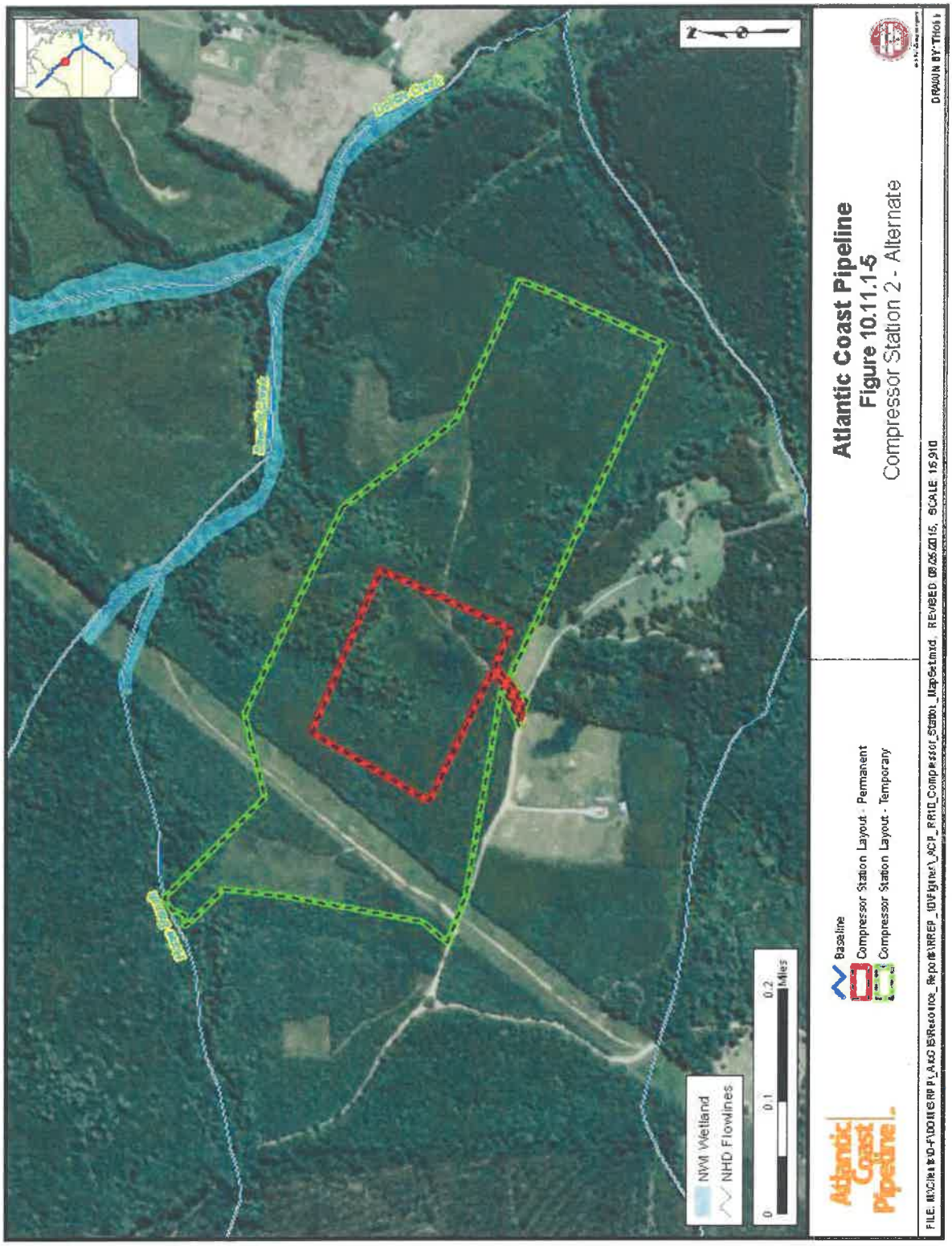
Compressor Station 2 Comparison for the Atlantic Coast Pipeline

Features	Unit	Compressor Station 2 Primary Site (Proposed)	Compressor Station 2 Alternate
Permanent easement	acres	12.9	13.1
Temporary construction workspace	acres	56.0	55.8
Additional miles of AP-1 mainline required	miles	0.0	1.1
Conservation easements	acres	0.0	0.0
Forested lands – Permanent	acres	12.8	10.6
Forested lands – Temporary	acres	36.1	38.8
Wetlands (National Wetlands Inventory) – Permanent	acres	0.0	0.0
Wetlands (National Wetlands Inventory) – Temporary	acres	0.0	0.0
Intermittent waterbodies	number	1	0
Perennial waterbodies	number	0	0
Prime Farmland – Permanent	acres	11.5	3.6
Prime Farmland – Temporary	acres	26.7	30.1
Noise Sensitive Areas within 0.5 mile	number	9	10

Compressor Station 2 and the CS2 Alternate site are similar in the size and extent of temporary and permanent impacts. While neither site contains wetlands, there is a small intermittent waterbody on the periphery of the primary site. The CS2 Alternate encompasses about 2.7 more acres of forested lands than the primary site, though the vegetation at both sites is characterized as immature. The primary site contains about 8.1 more acres of prime farmland soils than the alternate, but neither site is located in an actively cultivated area. There is one less noise sensitive area within 0.5 mile of the primary site than the alternate site.


Compressor Station 2
Compressor Station 2 Alternate
Atlantic Coast Pipeline
Figure 10.11.1-3
Compressor Station 2 and Alternate Location Map
Baseline
Compressor Station 2
Compressor Station 2 Alternate
Atlantic Coast Pipeline
0 2.5 5 Miles


Atlantic Coast Pipeline
Figure 10.11.1-4
Compressor Station 2
Baseline
Compressor Station Layout - Permanent
Compressor Station Layout - Temporary
NWI Wetland
NHD Flowlines
0
0.1
0.2
Miles
1913
192
1921
1919
1922
1923
56


Atlantic Coast Pipeline
Figure 10.11.1-5
Compressor Station 2 - Alternate
Baseline
Compressor Station Layout - Permanent
Compressor Station Layout - Temporary
NWI Wetland
NHD Flowlines
0
0.1
0.2
Miles

Because the CS2 Alternate site is located about 2 miles from the proposed route, an approximately 6.0-mile-long section of the AP-1 mainline would need to be realigned to access the site. This would increase the length of the AP-1 pipeline by approximately 1.1 miles, resulting in an additional 10 acres of permanent easement and 6.7 acres of temporary workspace for the ACP.[46] A final consideration is that the landowner of the primary site is willing to sell the property.

On balance, environmental impacts between the primary and alternate sites would be similar, but the alternate site would require additional pipeline which would increase the construction footprint of the project. Therefore, Atlantic selected the primary site as the preferred alternative.

10.11.1.3 Compressor Station 3

Atlantic identified and evaluated two sites for Compressor Station 3. The primary site is located in Northampton County, North Carolina, at the terminus of the AP-1 mainline and start of the AP-2 mainline and AP-3 lateral. This site is situated along Forest Road approximately 1.2 miles to the east of Highway 301 just south of the Virginia border. The site, which previously was owned by a commercial timber company, primarily consists of recently planted forest land. The primary site will have a permanent footprint of approximately 37.0 acres and an additional temporary workspace of 14.3 acres. The alternate site, CS3 Alternate, is located approximately 1.5 miles to the southeast of the primary site, also in Northampton County. Most of the site is forested, but a small portion consists of cultivated cropland. The alternate site would have a permanent footprint of approximately 37.0 acres and an additional temporary workspace of about 14.2 acres.

Figure 10.11.1-6 depicts the location of the primary and alternate sites. Figures 10.11.1-7 and 10.11.1-8 depict the boundaries of each site with an aerial background. Comparative environmental data on each site is provided in Table 10.11.1-2.

TABLE 10.11.1-2

Compressor Station 3 Comparison for the Atlantic Coast Pipeline

Features	Unit	Compressor Station 3 Primary Site (Proposed)	Compressor Station 3 Alternate
Permanent easement	acres	37.0	37.0
Temporary construction workspace	acres	14.3	14.2
Additional miles of AP-3 mainline required	miles	0.0	0.7
Conservation easements	acres	0.0	0.0
Forested lands – Permanent	acres	33.9	17.6
Forested lands – Temporary	acres	11.0	11.9
Wetlands (National Wetlands Inventory) – Permanent	acres	0.2	0.4
Wetlands (National Wetlands Inventory) – Temporary	acres	0.2	0.8
Intermittent waterbodies crossed	number	1	1
Perennial waterbodies crossed	number	0	0
Prime Farmland – Permanent	acres	26.7	32.6
Prime Farmland – Temporary	acres	6.9	9.7
Noise Sensitive Areas within 0.5 mile	number	13	2

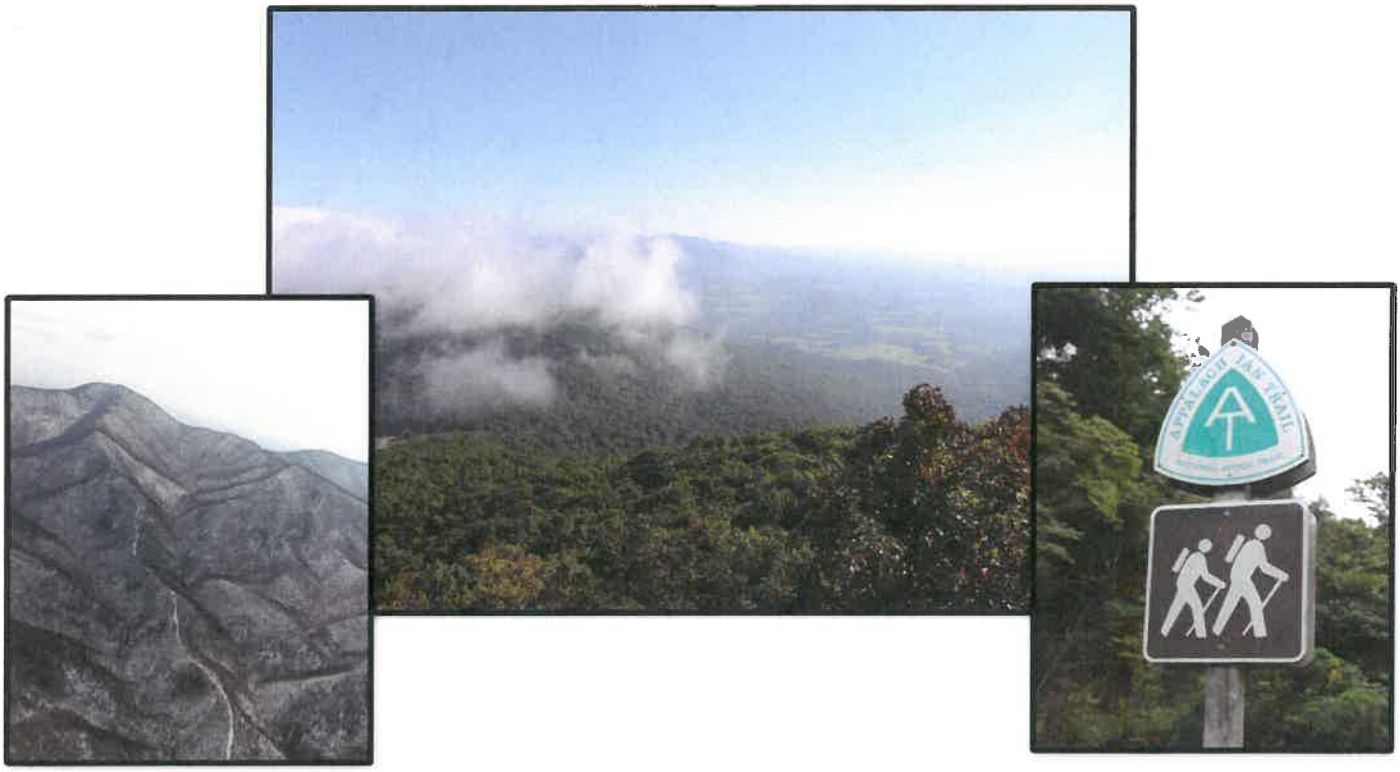
[46] This is based on a 125-foot-wide construction tight-of-way and 50-foot-wide permanent easement.

Federal Energy Regulatory Commission
Office of Energy Projects
Washington, DC 20426

Atlantic Coast Pipeline and Supply Header Project

Final Environmental Impact Statement

Volume I



Atlantic Coast Pipeline, LLC
Dominion Energy Transmission, Inc.

Docket Nos. CP15-554-000, CP15-554-001, CP15-555-000, and CP15-556-000
FERC/EIS-0274F

Cooperating Agencies:

U.S. Department of Agriculture – Forest Service

U.S. Army Corps of Engineers

U.S. Environmental Protection Agency

U.S. Fish and Wildlife Service

West Virginia Department of Environmental Protection

West Virginia Division of Natural Resources

July 2017

3.0 ALTERNATIVES

As required by NEPA, FERC policy, and CWA 404(b)(1) guidelines, and in cooperation with the FS and USACE, we identified and evaluated alternatives to ACP and SHP to determine whether an alternative would be technically and economically feasible, offer a significant environmental advantage over the proposed action, and would still meet the stated purpose of the proposed action. Specifically, we evaluated the no-action alternative, system alternatives, major pipeline route alternatives and route variations, and aboveground facility location alternatives.

Evaluation Process

Our evaluation of the identified alternatives is based on project-specific information provided by Atlantic and DETI, affected landowners, and other concerned parties; comments received during project scoping; publicly available information; our consultations with federal and state resource agencies; our own independent fieldwork; and our expertise and experience regarding the siting, construction, and operation of natural gas transmission facilities and their potential impacts on the environment. We established three key criteria to evaluate the identified alternatives, which included whether the alternative would:

- be technically and economically feasible and practical;
- offer a significant environmental advantage over the proposed action; and
- meet the projects' purpose, as described in section 1.1.

Through environmental comparison and application of our professional judgement, each alternative is considered to a point where it becomes clear if the alternative could or could not meet the three evaluation criteria. To ensure a consistent environmental comparison and to normalize the comparison factors, we generally use desktop sources of information (e.g., publicly available data, GIS data, aerial imagery) and assume the same right-of-way widths and general workspace requirements. Where appropriate, we also use site-specific information (e.g., field surveys or detailed designs), and consult with appropriate resource or land managing agencies to obtain additional site-specific information and their professional judgement regarding alternatives. As described previously, our environmental analysis and this evaluation only considers quantitative data (e.g., acreage or mileage) and uses common comparative factors such as total length, amount of collocation, and land requirements. Our evaluation also considers impacts on both the natural and human environments. Impacts on the natural environment include wetlands, forested lands, karst geology, and other common environmental resources. Impacts on the human environment include but are not limited to impacts on residences, roads, utilities, certain land uses, and industrial and commercial development near construction workspaces. In recognition of the competing interests and the different nature of impacts resulting from an alternative that sometimes exist (i.e., impacts on the natural environment versus impacts on the human environment), we also consider other factors that are relevant to a particular alternative or discount or eliminate factors that are not relevant or may have less weight or significance.

With respect to the first criterion, it is important to recognize that not all conceivable alternatives are technically feasible and practical. For example, some alternatives may not be possible to implement due to technological difficulties or logistics. We do not design natural gas pipeline projects. Rather, pipeline companies propose and design pipeline projects in response to market conditions. In turn, we analyze these proposals and a reasonable range of alternatives. Economically practical alternatives would result in an action that generally maintains the price competitive nature of the proposed action. Generally, we do not consider the cost of an alternative as a critical factor unless the added cost to design, permit, and construct the alternative would render the project economically impractical.

Determining if an alternative provides a significant environmental advantage requires a comparison of the impacts on each resource as well as an analysis of impacts on resources that are not common to the

alternatives being considered. The determination must then balance the overall impacts and all other relevant considerations. In comparing the impact between resources (factors), we also considered the degree of impact anticipated on each resource. Ultimately, an alternative that results in equal or minor advantages in terms of environmental impact would not compel us to shift the impacts from the current set of landowners to a new set of landowners. In conducting this analysis, it is important to recognize the environmental advantages and disadvantages of the proposed actions to focus the analysis on reasonable alternatives that may reduce impacts and offer a significant environmental advantage.

A preferable alternative must meet the stated purpose of the projects, which is to provide transportation of 1.44 million Bcf/d of natural gas to consuming markets at the delivery points specified by the projects' customers. A preferable alternative also would need to provide service within a reasonably similar timeframe. It is important to recognize that not all conceivable alternatives can meet the projects' purpose, and an alternative that does not meet the projects' purpose cannot be considered a viable alternative.

Using the evaluation criteria discussed above, each alternative was considered to the point where it was clear that the alternative was either not reasonable, would result in greater environmental impacts that could not be readily mitigated, offered no significant environmental advantages over the proposed projects, or could not meet the projects' purpose. Alternatives that appeared to result in less than or similar levels of environmental impact were reviewed in greater detail. The following sections discuss and analyze alternatives that warranted further review and provide sufficient detail to explain why they were eliminated from further consideration or are recommended for adoption into the respective project.

Public Comments

In evaluating alternatives, we considered and addressed, as appropriate, the numerous comments provided to the Commission about possible alternatives. Many of these comments requested that we evaluate alternatives to the proposed pipeline routes, the aboveground facility locations, or to eliminate or merge the proposed ACP and SHP with similar natural gas transportation projects that are currently proposed in the region. In response to these comments, we required Atlantic and DETI to provide additional environmental information, requested they assess the feasibility of certain alternatives as proposed by the commentors, conducted site visits and field investigations, met with affected landowners and local representatives and officials, consulted with federal and state regulatory agencies, and sought additional public input. These efforts, along with Atlantic's and DETI's continued assessment of their respective projects, resulted in numerous re-routings and facility design changes, which are summarized in the following sections. The alternatives and variations already incorporated by Atlantic and DETI into their proposed routes are included as part of our environmental analysis in section 4.0.

The Commission also received numerous comments suggesting that the electricity and power generated from natural gas could be generated and supplied by renewable energy sources such as solar and wind power, and that the use of these energy sources as well as gains realized from increased energy efficiency and conservation should be considered as alternatives to the projects. As stated in section 1.1, the purpose of ACP and SHP is to transport price-competitive natural gas from West Virginia to electric generation, distribution, and end use markets in West Virginia, Virginia, and North Carolina. The generation of electricity from renewable energy sources is a reasonable alternative for a review of power generating facilities. Authorizations related to how the project area would meet demands for electricity are not part of the application before the Commission and their consideration is outside the scope of this EIS. Therefore, because the purpose of ACP and SHP is to transport natural gas, and the generation of electricity from renewable energy sources or the gains realized from increased energy efficiency and conservation are not transportation alternatives, they cannot function as a substitute for ACP and SHP and are not considered or evaluated further in this analysis.

3.1 NO-ACTION ALTERNATIVE

The Commission has two courses of action in processing applications under section 7 of the NGA: 1) deny the requested actions (the no-action alternative); or 2) grant the Certificate, with or without conditions. If the no-action alternative is selected by the Commission, the proposed facilities would not be constructed, and the short- and long-term environmental impacts from the projects would not occur. In addition, if the no-action alternative is selected, the stated purpose of projects would not be met. The no-action alternative would eliminate the proposed natural gas supply for West Virginia, Virginia, and North Carolina markets, causing existing and potential users of natural gas to either pursue other means of natural gas supply, to rely on other fuels, or to seek other means to meet or curtail their energy needs.

According to the EIA, consumption of natural gas grew by 12 and 49 percent, respectively, in Virginia and North Carolina between 2010 and 2014. Gas-fired electric power generation was the leading contributor to increased gas consumption, increasing by 71 and 199 percent, respectively, in Virginia and North Carolina between 2011 and 2015 (EIA, 2016b, 2016c). Natural gas consumption is projected to continue increasing due to population growth, industrial consumption, and electric power generation (EIA, 2016a).

The lack of a new pipeline with access to supply sources into the region could prolong the existing supply constraints in the proposed delivery areas, which could create winter-premium pricing and exacerbate price volatility for all natural gas users in the areas, and could increase the difficulty for others, such as the operators of gas-fired electric generating plants, in finding economical gas supplies. This in turn could lead to higher gas and electric rates in the region and could lead to energy shortages during times of winter peak demand.

The burning of natural gas at power plants to produce electricity also results in reduced air emissions compared to other fossil fuels, such as coal and fuel oil. According to the EPA (2013a), natural gas produces at least 50 percent less carbon dioxide (CO_2), almost 70 percent less nitrogen oxides (NO_x), and about 99 percent less sulfur oxides (SO_x) compared to a coal-fired power plant. Since the 1990s, the transition to natural gas fueled power plants has substantially decreased dependence upon the formerly predominant energy sources of fuel oil, coal, and nuclear energy. If the no-action alternative were adopted, then air emissions could be increased if other sources of energy were used.

The no-action alternative would not provide the potential economic benefits associated with the proposed projects, including increased jobs, secondary spending, and tax revenues during construction, as well as increased property tax revenues to local governments during operations as discussed in section 4.9.8. Further, the no-action alternative would not provide natural gas service to end-use customers in Virginia and North Carolina. The abovementioned transition in energy sources to generate electricity has been hastened by the relative lower cost of natural gas, which has economic and cost savings benefits that are then passed along to consumers of electricity.

In summary, the no-action alternative would avoid the environmental impacts of the proposed projects, but would likely result in the need for an alternate energy means to satisfy the demand for natural gas and energy in the project area, or would result in end users seeking alternate energy from other sources such as other natural gas transporters, fossil fuels, or renewable energy. Given consideration of these factors, we conclude that the no-action alternative is not preferable to ACP and/or SHP and we do not recommend it.

3.2 SYSTEM ALTERNATIVES

The purpose of identifying and evaluating system alternatives is to determine whether potential environmental impacts associated with the construction and operation of the proposed facilities could be avoided or reduced while still meeting the basic purpose of the projects. System alternatives would make use of existing, modified, or other proposed natural gas transmission systems/facilities to meet the stated purpose of ACP and SHP. Implementation of a system alternative would make it unnecessary to construct all or part of the projects, although some modifications or additions to existing transmission systems/facilities, or other proposed transmission systems or facilities, may be required.

A viable system alternative to the projects would have to provide sufficient pipeline capacity to transport an additional 1.44 Bcf/d of natural gas to the delivery points specified by the precedent agreements signed by Atlantic and DETI within a timeframe reasonably similar to the proposed projects. Additionally, the system alternative must be technically and economically practical and offer a significant environmental advantage over the proposed projects. Our analysis of system alternatives includes an examination of existing and proposed natural gas transportation systems that currently serve or eventually would serve the markets targeted by the projects.

3.2.1 Existing Pipeline Systems

There are currently three existing natural gas pipeline transportation systems operating near the proposed project area: the Transco pipeline system, the Columbia Gas Transmission, LLC (Columbia) system, and the East Tennessee Natural Gas (East Tennessee) pipeline system. These pipelines currently do not have the available capacity to transport the required volumes of natural gas to the delivery points proposed for ACP and SHP, nor do these existing facilities have the necessary infrastructure to transport gas to the required delivery points. Even if additional pipelines were constructed to connect any of these pipeline systems to the supply and delivery areas for ACP, there still is not sufficient capacity on any of the existing pipeline systems to transport 1.44 Bcf/d of natural gas. Therefore, we do not consider use of existing pipeline systems as is, as feasible alternatives to the proposed projects.

3.2.2 Modification of Existing Pipeline Systems

Because none of the existing pipeline systems in the project area have the capacity to meet the projects' purpose in their current state, they would require modifications to meet the projects' purpose. These modifications could include greenfield pipeline construction to connect to the supply area, delivery area, or both; the use of existing pipeline where possible along with looped pipeline (i.e., new pipeline construction generally adjacent to an existing pipeline); additional compression; or some combination of these options.

3.2.2.1 Existing Transco Pipeline System

The existing Transco system consists of various diameter pipelines extending some 10,200 miles between Texas and New York, including through Virginia. The system has a peak design capacity of almost 11 Bcf/d of natural gas and delivers natural gas to markets in the Northeast, Mid-Atlantic, and Southeast region of the United States. To meet the purpose of ACP and SHP using the Transco Pipeline system, significant modifications would be necessary. Up to 300 miles of new pipeline and compressor station modifications would be required to connect supply areas to the Transco mainline. Additional upgrade of the Transco mainline, including new compression and looping, would be necessary to increase capacity and accommodate the volume of natural gas required for ACP. Construction of new mainline or lateral pipelines would also be necessary to reach the same delivery points as ACP in southeastern Virginia (approximately 160 miles) and North Carolina (approximately 180 to 200 miles). The environmental impacts associated

with these upgrades and new pipeline construction for the Transco system (a combined total of 640 to 680 miles of new pipeline) would likely be similar to the impacts of ACP and SHP, and we have not identified or received any information that suggests the alternative would provide a significant environmental advantage over ACP and SHP. Additionally, these modifications could not occur within a similar timeframe as the proposed projects. For this reason, and the fact that the existing system does not meet ACP's project purpose, modifications to the existing Transco system are not considered a viable system alternative.

3.2.2.2 Existing Columbia Gas Transmission System

The existing Columbia system delivers natural gas from supply areas in the Appalachian basin to demand areas in southern Virginia, including the City of Chesapeake. The Columbia system has a capacity to transport of an average of about 3 Bcf/d of natural gas. The FERC staff has determined that this capacity is currently contracted as evidenced by Columbia's own proposal for expansion in the area as described in FERC Docket CP16-38 (WB XPress Project). Like the Transco scenario above, significant modifications to the Columbia pipeline system would be necessary to meet the purpose of ACP and SHP. Similar pipeline and compressor station modifications as those of SHP would be required to connect supply areas to the Columbia pipeline system. About 400 miles of new pipeline loop would be required to reach the proposed ACP delivery points in southern Virginia. Additional new pipeline construction would also be required to reach the delivery points in North Carolina, much of which could be similar to the proposed AP-2 mainline for ACP. The environmental impacts associated with construction of these facilities would likely be similar to or greater than those of ACP, and we have not identified or received any information that suggests the alternative would provide a significant environmental advantage over ACP and SHP. For this reason, and the fact that the current system does not meet ACP's purpose and need, modification of the Columbia pipeline system is not considered a viable alternative to ACP and SHP.

3.2.2.3 Existing East Tennessee Natural Gas System

The East Tennessee pipeline system has the capacity to transport almost 1.9 Bcf/d of natural gas and extends from western Tennessee to central and southern Virginia and northern North Carolina, where it interconnects with the Transco pipeline system. The FERC staff has determined that this capacity is currently contracted, and the addition of 1.44 Bcf/d would result in looping, new pipeline construction, and new compression along the East Tennessee pipeline system. New pipeline construction would be required to access the same supply areas as ACP (150 to 180 miles), and provide access to the same delivery points as ACP in southern Virginia (210 to 230 miles) and North Carolina (190 to 210 miles). The environmental impacts associated with the system upgrades and new pipeline construction (a minimum of between 550 and 620 miles of new pipeline) would likely be similar to or greater than those of ACP, and we have not identified or received any information that suggests the alternative would provide a significant environmental advantage over ACP and SHP. For this reason, and the fact that the current system does not meet ACP's purpose and need, modification of the existing East Tennessee system is not considered a viable alternative to ACP and SHP.

3.2.3 Proposed Pipeline Projects

In addition to modifying existing pipeline systems, we considered the potential to make use of or modify proposed natural gas pipeline transmission projects in the project area to meet the purpose and need of ACP and SHP. There are currently two, viable, major natural gas transportation projects proposed in the general vicinity of ACP and SHP: MVP and the WB XPress Project. An evaluation of the potential for these projects to meet the purpose of ACP and SHP is provided in the following subsections.

3.2.3.1 Proposed WB XPress Project

Columbia is proposing to construct and operate about 29 miles of various diameter pipelines in multiple segments, modifications at seven existing compressor stations, and construction of two new compressor stations, in West Virginia and Virginia. This WB XPress Project would enable Columbia to increase gas transportation services to a major local distribution company and increase deliveries to third-party interstate pipelines. The longest single pipeline segment would be 25.4 miles of 26-inch-diameter replacement pipeline in Randolph and Pendleton Counties, West Virginia. Most of the new pipeline segments would be constructed adjacent to Columbia's existing WB pipeline. The WB XPress Project would deliver up to 1.3 Bcf/d of natural gas and is currently under review by the FERC under Docket No. CP16-38-000.

The WB XPress Project does not align with the delivery and receipt points of ACP and SHP and would not have sufficient capacity to deliver the contracted volume of natural gas (2.74 Bcf/d) for both ACP/SHP and WB Xpress customers. Therefore, we conclude the WB XPress Project is not a viable alternative to ACP and SHP.

3.2.3.2 Proposed Mountain Valley Pipeline and Equitrans Expansion Projects

Mountain Valley Pipeline, LLC (Mountain Valley) proposes to construct and operate about 301 miles of 42-inch-diameter pipeline from Wetzel County, West Virginia to an interconnection with the existing Transco pipeline system in Pittsylvania County, Virginia. This project, known as MVP, would deliver up to 2 Bcf/d of natural gas to different end-users connected to the Transco system, including local distribution companies, industrial users, and power generation facilities in the Appalachian, Mid-Atlantic, and Southeast regions. MVP is currently under review by the FERC under Docket No. CP16-10-000.

To support MVP, Equitrans, L.P. (Equitrans) is proposing to construct and operate about 7.9 miles of pipeline that would connect with MVP at the Webster Interconnect and Mobley Tap in Wetzel County, West Virginia. This project, known as the Equitrans Expansion Project (EEP), proposes facilities with a design capacity of 600,000 Dth/d. The EEP is currently under review by the FERC under Docket No. CP16-13-000. Because MVP and EEP are interrelated, the FERC is analyzing both together in one joint EIS. The draft EIS for MVP and EEP was issued on September 16, 2016, under FERC Accession No. 20160916-4001. While MVP and EEP would originate from the same region as ACP and SHP, each project would serve different customers and end-use markets.

To meet the same objective as ACP and SHP, MVP/EEP would need to be expanded to provide an additional 1.44 Bcf/d of natural gas and reach ACP delivery points in West Virginia, Virginia, and North Carolina. This objective could conceptually be accomplished by either merging ACP and MVP into one pipeline system or collocating the pipelines along similar routes. Merging of ACP with the proposed MVP is analyzed below, while collocating ACP along MVP route is analyzed in section 3.3.1. FERC staff also analyzed the potential for MVP to be merged with or collocated along ACP route in the MVP/EEP draft EIS.

MVP Merged Systems Alternative

This system alternative would primarily follow the proposed MVP route and would require the capacity of both MVP and ACP, a total of approximately 3.44 Bcf/d, to be transported through one large diameter pipeline to Transco's existing Compressor Station 165 in Pittsylvania County, Virginia. At this delivery point, the alternative would continue to ACP delivery points in Virginia and North Carolina as shown on figure 3.2.3-1.

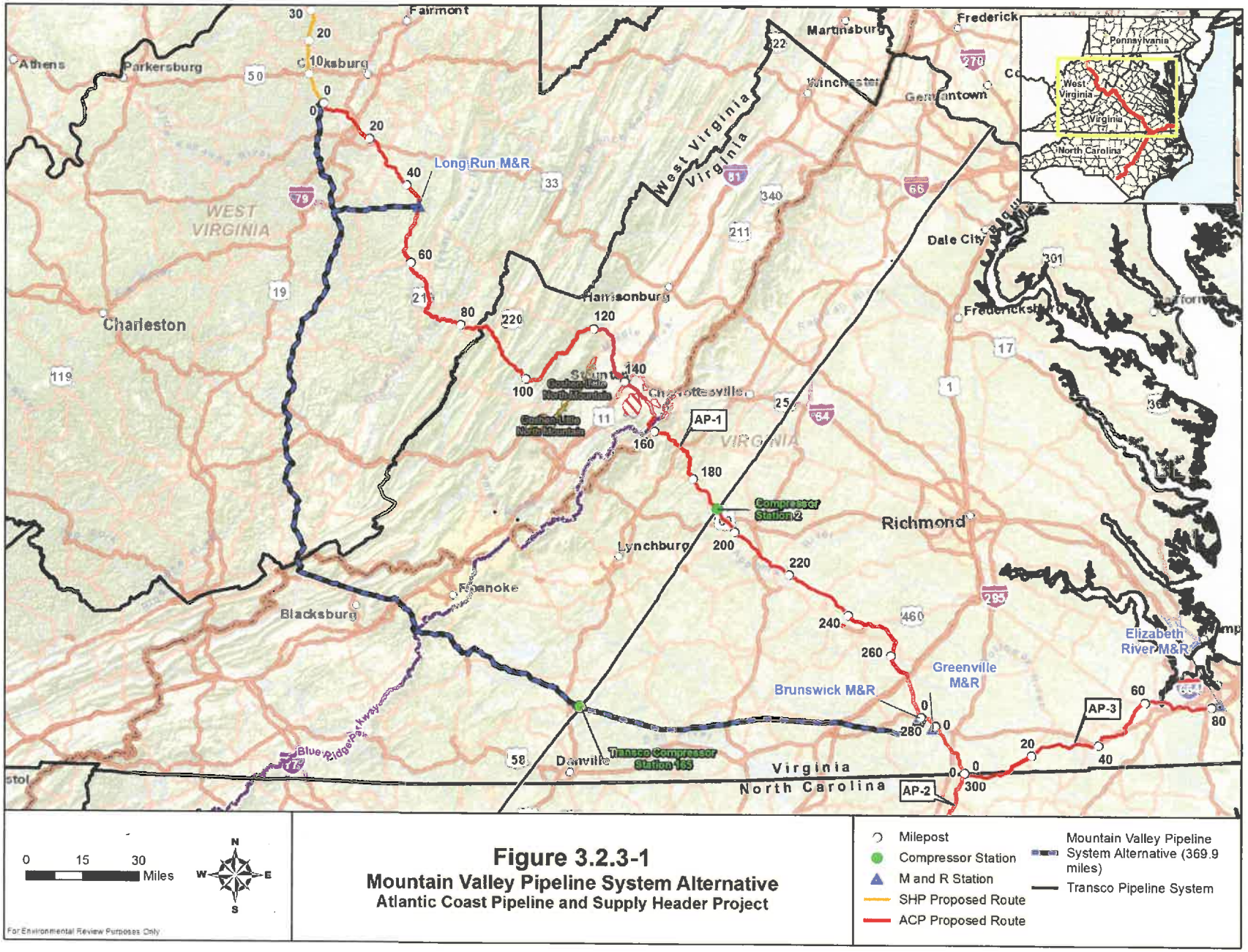


Figure 3.2.3-1
Mountain Valley Pipeline System Alternative
Atlantic Coast Pipeline and Supply Header Project

To meet the delivery requirements of both ACP and MVP, the following pipeline segments would need to be constructed:

- 3.9 miles of 30-inch-diameter pipeline in Westmoreland County, Pennsylvania (i.e., the TL-636 loopline, which is part of the proposed SHP);
- about 7 miles of 30-inch-diameter pipeline in Wetzel County, West Virginia to supply natural gas from the Hastings Compressor Station to the starting point of MVP;
- 301 miles of either 42- or 48-inch-diameter pipeline along the proposed MVP route to Transco Compressor Station 165;
- about 25 miles of small diameter lateral pipeline to connect the large diameter pipeline to Atlantic's Long Run M&R Station delivery point in Randolph County, West Virginia;
- about 112 miles of 42-inch-diameter pipeline to transport about 1.44 Bcf/d natural gas from the Transco Compressor Station 165 to the Brunswick Power Station and onward to the proposed ACP Compressor Station 3;
- 183 miles of 36-inch-diameter pipeline from ACP Compressor Station 3 to Robeson County, North Carolina (i.e., Atlantic's AP-2 mainline);
- 79.3 miles of 20-inch-diameter pipeline from ACP Compressor Station 3 to the City of Chesapeake, Virginia (i.e., Atlantic's AP-3 lateral); and
- 1.1 miles of 16-inch-diameter pipeline to the future Dominion Virginia Power (DVP) electric generation facility (i.e., Atlantic's AP-5 lateral).

In addition to the pipeline segments identified above, modification of Transco's existing pipeline system from its Compressor Station 165 to the proposed ACP Woods Corner M&R Station in Buckingham County, Virginia may be required. If needed, the modifications could range from adding compression to Transco's existing system to looping the entire 65-mile-long pipeline segment. Assuming a full loop of the Transco pipeline system is necessary between Transco's Compressor Station 165 and Atlantic's proposed Woods Corner M&R Station, ACP and MVP merged systems alternative would require the construction of about 777 miles of pipeline. The cumulative lengths of the EEP and MVP (309 total miles) and ACP and SHP (641 miles) totals 950 miles. Therefore, the length of the merged system alternative would be 173 miles shorter than the cumulative mileage of each separate project.

Atlantic evaluated the feasibility of merging ACP and MVP into one pipeline system[1] by utilizing either a 42-inch-diameter pipeline with 1,440 psig operating pressure; utilizing a 42-inch-diameter pipeline with 2,075 psig operating pressure; or utilizing a 48-inch-diameter pipeline (operating pressure was not specified). Atlantic concluded that utilizing a 42-inch-diameter pipeline would require thicker-walled pipe or higher grade steel to withstand the increased operating pressure of the pipeline. According to Atlantic, the higher operating pressure would restrict Atlantic's ability to provide operational flexibility needs for potential flow rate variations and line pack, and may prohibit any future expansion of the pipeline system. As stated in section 2.7, ACP Foundation Shippers have a one-time right to request an increase in contracted capacity by participation in an Optional Expansion totaling up to 500,000 Dth/d, and have requested a

[1] Atlantic's assessment can be found under FERC Accession No. 20151217-5026 at the following website location (under the Files, select the PDF files titled "Public RR10 Alternatives 12-16.pdf): http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20151217-5026.

Second Expansion option contingent upon regulatory approvals. In addition, the improved pipe grade would increase the weight of the pipe by approximately 43 percent, require larger construction equipment to install the pipe, reduce the elasticity of the pipeline, increase the complexity of welding, and possibly increase the duration of construction. Atlantic also stated that the increased operating pressure needed to transport 3.44 Bcf/d through a 42-inch-diameter pipeline would require several additional compressor stations.

Utilizing a 48-inch-diameter pipeline to transport the combined volumes of ACP and MVP would also increase the weight and reduce the elasticity of the pipeline, increase the complexity of welding, require greater trench excavations, increase the width of the construction workspace by at least 25 feet, and increase construction complexity in steep terrain. However, the operating pressure and compression requirements of this option would be reduced and may allow for future expansion of the system.

A 48-inch-diameter pipeline would encompass an area in the trench about 30 percent larger than a 42-inch-diameter pipeline, thereby displacing at least 30 percent more spoil. Although the Interstate Natural Gas Association of America (INGAA, 1999) did not estimate construction right-of-way widths for a 48-inch-diameter pipeline, which was non-typical at the time of the study, INGAA's study did conclude that an additional 15 feet of construction right-of-way width would be needed for a 40- to 42-inch-diameter pipeline compared to a 30- to 36-inch-diameter pipeline. We have found in practice that these estimates are generally accurate. This information is useful for comparative purposes. The study further noted that other factors such as vertical slopes and side slopes, special erosion control requirements in steep areas, and stockpiling of excess rock, typically would increase construction right-of-way widths even further. These conditions would be found along ACP route, and we estimate that an additional 30 feet or more of extra construction right-of-way width would be needed for a theoretical 48-inch-diameter pipeline.

The merged system alternative using 48-inch-diameter pipe would hold several environmental advantages over constructing both projects separately, including increased collocation with existing utility rights-of-way, avoidance of the MNF and GWNF, reduced crossings of the ANST and the BRP from two to one, reduced number of access roads and contractor/pipe yards impacted, and less construction in karst topography. Merging the pipeline systems would also reduce overall land impacts by minimizing the number of access roads and contractor/pipe yards used, and by reducing the amount of permanently maintained pipeline right-of-way. Despite these environmental advantages, construction of the merged systems alternative would increase air and noise emissions due to the amount of additional compression required to transport 3.44 Bcf/d through one pipeline.

In conclusion, construction and operation of merged system alternative may hold an environmental advantage when compared to construction and operation of both ACP/SHP and MVP/EEP separately. However, pursuing this alternative would require significant time for the planning and design, result in a significant delay to the delivery of the 3.44 Bcf/d of natural gas to the proposed customers of both ACP and MVP, and would limit the ability to provide additional gas to the projects' customers. When the environmental factors, technical feasibility, and ability to meet the purpose and need of the projects are cumulatively considered, we do not find that the merged system alternative holds a significant advantage over the proposed actions and have eliminated it from further consideration.

3.2.4 LNG Import/Export

LNG is transported daily throughout the world via LNG ship carriers. Currently, the Cove Point and Elba Island LNG Terminals are the only operating LNG terminals near the projects. The Cove Point LNG Terminal was recently approved to export 7.82 million metric tons per annum (1.0 Bcf/d on average) of LNG to market. The Elba Island LNG Facility was recently approved to export about 2.5 million tons per annum (0.33 Bcf/d) of LNG to market. Theoretically, LNG could be shipped from either or both

terminals to an import facility that could service ACP customers. However, there are no plans to construct and operate LNG import terminals that could reasonably service the project area. Additionally, the combined delivery volumes of Cove Point and Elba Island terminals would not be sufficient to meet the requested delivery volumes for ACP; therefore, significant modifications of the pipeline systems that deliver natural gas to the terminals would be required, and significant pipeline facilities would need to be constructed to deliver gas from a new import facility to delivery points for ACP. Due to these constraints, we do not consider the use of LNG import/export facilities a viable alternative.

3.2.5 Use of Trucks and/or Rail

LNG in relatively small volumes is transported via truck and/or rail in many locations throughout the United States, including ACP project area. Commercially available LNG tanker trucks have storage/ transmission capacities that average 10,850 gallons, and commercially available railway tankers have storage/transmission capacities that average 30,680 gallons. Based on the capacities of these systems, it would take approximately 1,674 trucks per day, or 592 railway tankers per day, to deliver the 1.44 Bcf/d of gas to the proposed delivery points of ACP. In addition, liquefaction and vaporization facilities would need to be constructed at the receipt and delivery points, respectively. Based on the number of trucks and/or rail cars that would be needed to transport the projects volumes and the facilities, time, and cost necessary to process and deliver these volumes, we have determined the use of this system would not be economically practical and have eliminated it from further review.

3.3 MAJOR ROUTE ALTERNATIVES

We considered other routes for the projects to determine if the route alternatives would avoid or reduce impacts on environmentally sensitive resources, including land use impacts. Route alternatives are typically only recommended if the alternative confers a significant environmental advantage over the proposed route. Otherwise, such an alternative merely represents a shift in impacts from one area or resource to another, or from one set of landowners to a different set of landowners. Major route alternatives are generally greater than 50 miles in length and can deviate from the proposed route by a significant distance.

3.3.1 ACP and MVP Collocation

Several commentors recommended that ACP route be collocated along the proposed MVP route. Similar to the merged systems alternative analyzed in section 3.2.3.2, the collocation alternative would involve the construction of dual 42-inch-diameter pipelines along the proposed MVP pipeline route to Transco's existing Compressor Station 165 in Pittsylvania County, Virginia. At this delivery point, the alternative would continue to ACP delivery points in Virginia and North Carolina as shown on figure 3.2.3-1. The same pipeline segments that are described in the merged systems alternative would need to be constructed for this collocation alternative; however, instead of one 301-mile-long large diameter pipeline along the MVP route, two separate 42-inch-diameter pipelines would be constructed adjacent to each other along one utility right-of-way.

The collocation alternative would provide some environmental advantages, including increased collocation along existing rights-of-way, avoidance of the MNF and GWNF, reduced crossings of the ANST and the BRP from two to one, reduced construction within karst topography, and reduced access roads and contractor and pipe yards impacts as these project areas could be utilized by each project.

The installation of two parallel pipelines for 301 miles would present significant constructability issues as a portion of MVP route in northern West Virginia follows narrow ridgelines. Based on our review of data, aerial photography, and topography, we conclude that there is insufficient space along most

ridgelines in West Virginia to accommodate two parallel 42-inch-diameter pipelines. Therefore, the advantages of collocating the two projects are reduced. Additionally, implementation of this alternative would require significant planning and design, which would significantly delay the delivery of gas to Atlantic's customers. When the environmental factors, technical feasibility, and ability to meet the purpose and need of the projects are cumulatively considered, we do not find that the collocation alternative offers a significant advantage and do not recommend its adoption.

3.3.2 Multiple Electric Transmission Line Route Alternatives

Many stakeholders suggested that collocating with existing power lines would be generally preferable to a new corridor; therefore, we analyzed a set of route alternatives that parallel portions of various existing electric transmission lines across West Virginia, Virginia, and North Carolina. These include the Hastings to Dooms, Dooms to Suffolk, and Pleasant Shade to St. Pauls alternatives, as well as a route alternative that would begin at Dooms, follow a southeasterly transmission line corridor to Bremo Bluff and south to Farmville in response to public comments received during scoping. We analyzed these route alternatives separately and as a whole; to do so, we developed a new 12.9-mile-long "connector" route from AP-1 MP 145.7 that follows an existing transmission line corridor to connect to Dooms in Augusta County, Virginia, where three of the four analyzed segments either originate or terminate. We have developed this route to generally avoid concentrated development in the town of Fisherville as well as the Augusta County Source Water Protection District. This allows each segment to be analyzed as a stand-alone segment as compared to the corresponding segment of the proposed route. These route alternatives are depicted on figure 3.3.2-1 and are further described below.

3.3.2.1 Hastings to Dooms

The Hastings to Dooms segment would originate at DETI's existing Mockingbird Hill Compressor Station (i.e., approximately at MP 33.6 of the proposed TL-635 loopline) near Hastings in Wetzel County, West Virginia. The route alternative generally follows existing electric transmission line corridors north of U.S. Highway 50 through Metz, Marion, Harrison, Taylor, and Preston Counties, West Virginia. West of Rowlesburg, West Virginia, there are two transmission line corridor options: the northern corridor across Preston County, West Virginia; Garrett County, Maryland; and Grant County, West Virginia, and the southern route across Preston, Tucker, and Grant Counties, West Virginia. Both meet at Mount Storm Lake and then follow other transmission lines across Grant, Hardy, and Pendleton Counties, West Virginia and Rockingham and Augusta Counties, Virginia to terminate near Dooms. To be a stand-alone route alternative, it would have to connect to the AP-1 mainline near MP 145.7 via a 12.9-mile-long connector segment. Atlantic would also need to construct an approximate 32.6-mile-long pipeline loop for SHP that starts at the beginning of the route alternative near the Mockingbird Hill Compressor Station to fulfill receipt obligations to the south. In total, the Hastings to Dooms segment of the route alternative would measure up to 250.2 miles in length (204.7 miles of mainline pipe from Hastings to Dooms, 32.6 miles of SHP loop, and 12.9 miles of pipe from AP-1 MP 145.7 to Dooms).

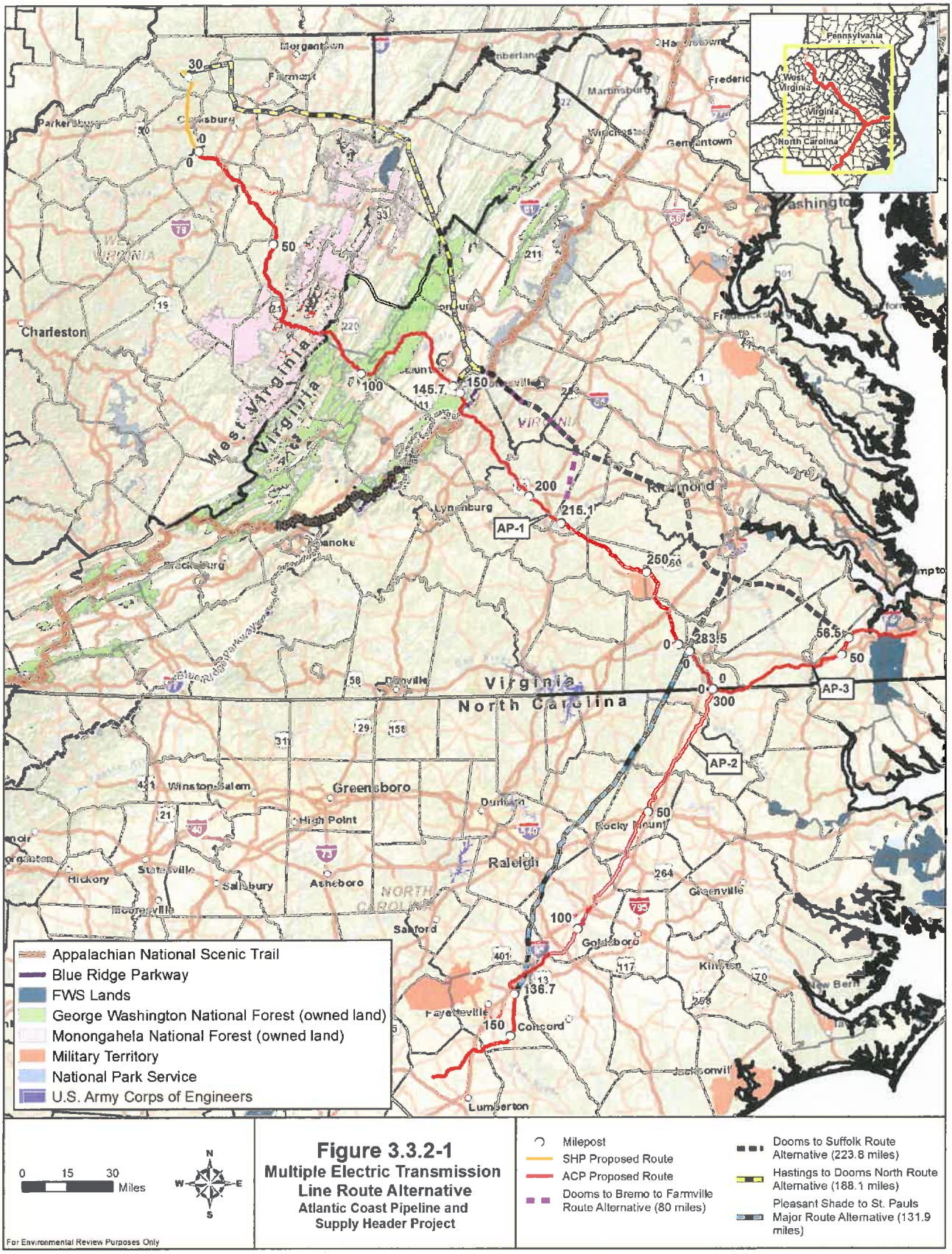


Figure 3.3.2-1
Multiple Electric Transmission Line Route Alternative
Atlantic Coast Pipeline and Supply Header Project

- Milepost
- SHP Proposed Route
- ACP Proposed Route
- Dooms to Bremo to Farmville Route Alternative (80 miles)
- Dooms to Suffolk Route Alternative (223.8 miles)
- Hastings to Dooms North Route Alternative (188.1 miles)
- Pleasant Shade to St. Pauls Major Route Alternative (131.9 miles)

While transmission line corridors often offer an opportunity to increase collocation and decrease habitat fragmentation and other greenfield impacts, this segment of the route alternative would offer unique pipeline constructability issues that may not have been realized when the transmission lines were built, due to the nature of pipeline construction practices. Long stretches of steep side slope between Hastings and Mount Storm Lake, Allegheny Front, New Creek Mountain, Middle Mountain, Shenandoah Mountain, and Second Mountain would require that the pipeline be routed away from the existing corridor to cross ridges perpendicular to the slope and would add to the total length of the route alternative. This route alternative also encroaches upon developed areas of Haywood/Lumberport, West Virginia; the area along State Road 28/55 in Grant County, West Virginia; Lilly in Rockingham County, Virginia; and Fisherville and Dooms in Augusta County, Virginia, where residences and other buildings have built up adjacent to the existing electric transmission line. Alternate routes to avoid these areas could increase the length and environmental impact of the alternative, and end with non-collocated right-of-way, similar to the proposed route, just in a different location, conferring no obvious advantage. Finally, the alternative route would cross an additional 1.0 mile of land owned by the GWNF, and it is likely that Atlantic would need to construct a new corridor through the GWNF due to the amount of side slope construction that would be required along the existing transmission corridor.

The Hastings to Dooms route alternative is 43.2 miles longer than the corresponding segment of the proposed route and would introduce new routing concerns. Atlantic would likely not be able to optimize collocation with the existing transmission lines in all cases, and some deviations from the transmission line corridors could be significant, further decreasing the benefit of collocation and adding additional mileage to the project. Although in many cases, steep slopes are not in themselves construction or routing constraints, this alternative appears to only increase the number of steep slopes crossed while increasing impacts to developed areas. Based on the factors analyzed above, we find that this route alternative would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project.

3.3.2.2 Dooms to Suffolk

The Dooms to Suffolk segment would originate near Dooms in Augusta County, Virginia and would follow existing transmission lines across Augusta, Albemarle, Fluvanna, Cumberland, Powhatan, Chesterfield, Dinwiddie, Prince George, Sussex, and Isle of Wight Counties, Virginia. To be a stand-alone route alternative, it could to connect the AP-1 mainline near MP 145.7 via a 12.9-mile-long connector segment. It would terminate at AP-3 MP 56.5. Atlantic would need to construct an additional 27-mile-long pipeline to connect this route alternative back to AP-1 at MP 283.5 so that the pipeline could connect to the AP-4 and AP-5 lateral delivery points and the AP-2 mainline. This segment would start near Carlson and follow an existing electric transmission line south across Dinwiddie, Sussex, and Greensville Counties, Virginia. In total, the Dooms to Suffolk segment of the route alternative is about 223.8 miles in length (210.9 miles of mainline pipe from Dooms to Suffolk and the route to connect to AP-2, and 12.9 miles of pipe from AP-1 MP 145.7 to Dooms).

While transmission line corridors often offer an opportunity to increase collocation and decrease habitat fragmentation and other greenfield impacts, this segment of the route alternative presents unique routing constraints that would limit opportunities for collocation. Atlantic would likely need to construct a greenfield route to avoid NPS lands in the Shenandoah National Park and ANST crossings north of Front Royal, Virginia, which could add about 20 miles to the route alternative. The route alternative also encroaches upon developed lands near Yancey Mills in Albemarle County; Antioch in Fluvanna County; Hamilton in Cumberland County; Red Land and Holly Hills in Powhatan County; Midlothian in Chesterfield County; the area along the Appomattox River in Chesterfield and Dinwiddie Counties;

Sutherland in Dinwiddie County; and the City of Suffolk. Atlantic would likely need to develop route variations and adjustments to avoid these areas, which would add additional mileage.

The Dooms to Suffolk segment is 69.1 miles longer than the currently proposed ACP route and there are unique land use constraints along the alternative. Atlantic would likely not be able to optimize collocation with the existing transmission lines in all cases, and some deviations from the transmission line corridors could be significant, further decreasing the benefit of collocation and adding additional mileage to the Project. Based on the factors analyzed above, we find that this route alternative would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project.

3.3.2.3 Dooms to Bremo to Farmville

We received comments during scoping that Atlantic should consider collocating a portion of the AP-1 mainline with electric transmission lines from Dooms to Bremo and then to Farmville, Virginia. In response to these comments, we reviewed a route alternative that would begin in Dooms and travel along the transmission corridor to Bremo and head south along the electric transmission corridor to the intersection of the proposed pipeline at AP-1 MP 216.1 north of Farmville. Commentors did not propose a way to connect the AP-1 mainline to Dooms; therefore, we again used our 12.9-mile-long connector route that starts at AP-1 MP 145.7 and ends at Dooms. The portion of the corridor starting at Dooms was analyzed as part of the Dooms to Suffolk Route Alternative (see section 3.3.2.2) and the Lyndhurst to Farmville Route Alternative (see section 3.3.7.2). In total, the Dooms to Bremo to Farmville route alternative measures about 80.0 miles in length (67.1 miles of mainline pipe from Dooms to Bremo to Farmville and 12.9 miles of pipe from AP-1 MP 145.7 to Dooms).

While transmission line corridors often offer an opportunity to increase collocation and decrease habitat fragmentation and other greenfield impacts, this segment of the route alternative presents routing constraints that would limit opportunities for collocation. This segment encroaches upon developed lands near Yancey Mills in Albemarle County and Antioch in Fluvanna County; greenfield route variations and adjustments would thus likely be necessary to avoid developed lands. These same impacts would be realized along the Dooms to Suffolk route alternative where their routes are shared.

The Dooms to Bremo to Farmville Route Alternative is 10.7 miles longer than the currently proposed ACP route, and Atlantic would likely not be able to optimize collocation with the existing transmission lines in all cases. These deviations from the transmission line corridors would decrease the benefit of collocation and add additional mileage to the project. Based on the factors analyzed above, we find that this route alternative would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project.

3.3.2.4 Pleasant Shade to St. Pauls

The Pleasant Shade to St. Pauls Route Alternative would originate at approximate AP-1 MP 284 in Brunswick County, Virginia. The route alternative then follows an existing electric transmission line south across Brunswick County, Virginia through Northampton, Halifax, Warren, Franklin, Wake, Johnston, Harnett, Cumberland and Robeson Counties, North Carolina to AP-2 MP 136.7. Atlantic would need to construct additional laterals to reach established delivery points: the proposed AP-3 lateral would need to be extended about 15 miles to the west, and laterals would need to be constructed to reach the Greensville M&R Station (about 1 mile), the Smithfield M&R Station (about 19 miles), and the Fayetteville M&R Station (about 3 miles). The Pleasant Shade to St Pauls segment of the route alternative is about 131.9 miles in length, and the laterals would increase the length of the route alternative by about 38 miles to 169.9 total miles. The route alternative would encounter developed areas along the transmission line corridors

outside Raleigh, North Carolina, and Atlantic would likely need to construct avoidance routes to the east, which would likely be greenfield and could further increase the length of the route alternative and decrease the attempted benefits of collocation.

The considered Pleasant Shade to St Pauls segment and associated laterals are approximately 14.7 miles longer than the proposed ACP route. Atlantic would likely not be able to optimize collocation with the existing transmission lines in all cases, and some deviations from the transmission line corridors could be significant, further decreasing the benefit of collocation and adding additional mileage to the project. Based on the factors analyzed above, we find that this route alternative would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project. Furthermore, Atlantic's current proposed route near Fayetteville has been designed to further collocate with existing transmission lines to the east of the city, which partially achieves the purpose of greater collocation along the AP-2 mainline than Atlantic's original route, while avoiding developed areas (see table 3.5-1).

Used alone or in any combination, these transmission line route alternatives would increase the length of the projects. It is likely that the lengths of the route alternatives would need to be further increased during engineering to avoid developed areas. This would increase the area of environmental impact of the projects, and the current state of development of these areas makes total collocation, the intent of the alternatives, highly unlikely. We conclude that the Hasting to Dooms, Dooms to Suffolk, Dooms to Bremo to Farmville, and Pleasant Shade to St Pauls segments, used alone or in any combination, do not confer a significant environmental or technical advantage when compared to the proposed route. We also find that Atlantic's other attempts to collocate with transmission lines (for example, the route variation near Fayetteville [see table 3.5-1]) offer more environmental advantage while not increasing human impacts, and we support those efforts.

3.3.3 Interstate and Highway Route Alternatives

In its FERC application, Atlantic considered collocating the proposed pipeline facilities alongside existing highways to maximize placement alongside existing linear corridors. These ideas were echoed by stakeholders during scoping; we also considered how these rights-of-way could be used to reduce habitat fragmentation. While natural gas pipelines may be sited adjacent to, but outside of a highway right-of-way, highway route alternatives present numerous construction challenges, including traversing roadway overpasses and underpasses, large interchange areas congested with commercial and residential developments, following switchbacks, and construction alongside roads that are adjacent to waterbodies. Furthermore, the use of interstate highway rights-of-way to accommodate public utilities is permissible only if the utility is in the public interest, the utility would not interfere with the safe and free flow of traffic, and the utility would not conflict with future expansions or uses of the highway. Four highway and interstate alternatives were evaluated for the projects and are depicted on figure 3.3.3-1 and described below.

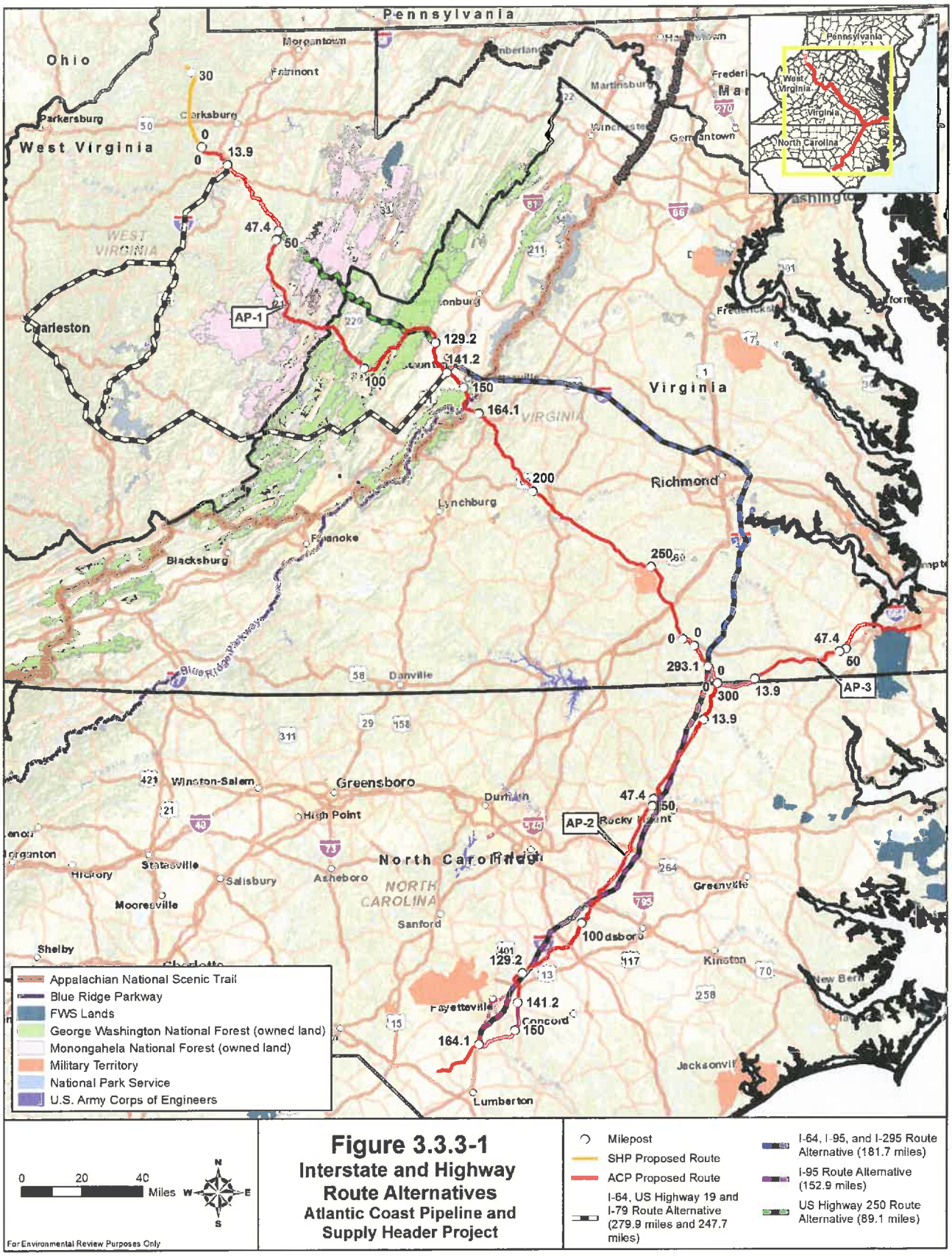


Figure 3.3.3-1
Interstate and Highway Route Alternatives
Atlantic Coast Pipeline and Supply Header Project

- **Interstate 64/Interstate 79/ Route Alternative**: This alternative would collocate a portion of the AP-1 mainline with Interstate 64 and Interstate 79. The route alternative follows Interstate 79 south and west from AP-1 MP 13.9 to join Interstate 64 in Charleston, West Virginia, then southeast through Beckley, Lexington, and Staunton Counties, West Virginia to AP-1 MP 141.2. The route alternative is about 279.9 miles in length, which is 123.5 miles longer than the corresponding segment of the proposed route. We also considered a variation of this route alternative that follows Interstate 79 from AP-1 MP 13.9 until it intersects with U.S. Highway 19. It follows Highway 19 south until it intersects with Interstate 79 to AP-1 MP 141.2. This variation of the route alternative is about 247.7 miles in length, which is 91.3 miles longer than the corresponding segment of the proposed route.

- **U.S. Highway 250 Alternative**: This alternative would collocate a portion of the AP-1 mainline with U.S. Highway 250. The route alternative follows U.S. Highway 250 southeast from AP-1 MP 47.4 near Huttonsville, West Virginia to Augusta County, Virginia near AP-1 MP 129.2. The route alternative is approximately 89.1 miles in length, which is 22.2 miles shorter than the corresponding segment of the proposed route.

- **Interstate 64/ Interstate 295/Interstate 95 Alternative**: This alternative would collocate a portion of the AP-1 mainline with Interstate 64, Interstate 295, and Interstate 95. The route alternative follows Interstate 64 south from AP-1 MP 141.2 to Richmond, Virginia, then follows Interstate 295 north and east to Interstate 95, and then follows Interstate 95 south to Greensville County, Virginia and AP-1 MP 293.1. The route alternative is approximately 181.7 miles in length, which is 29.8 miles longer than the corresponding segment of the proposed route. This route also would require an additional lateral to connect to the Brunswick County M&R station, which resulting in an additional 46 miles of pipeline. Two additional alternatives that utilize the Interstate 64 corridor through Rockfish Gap are analyzed in section 3.3.7.

- **Interstate 95 Alternative**: This alternative would collocate a portion of the AP-1 and AP-2 mainlines with Interstate 95. The route alternative follows Interstate 95 south in Greensville County, Virginia from AP-1 MP 293.1 to AP-2 MP 164.1. The route alternative is approximately 152.9 miles in length, which is 21.7 miles shorter than the corresponding segment of the proposed route. While this route would shorten the corresponding segments of the AP-1 and AP-2 mainlines this route also would require increasing the AP-3 lateral by 4 miles, resulting in a total of 17.7 fewer miles of pipeline.

We conclude that the Interstate 79/Interstate 64 and Interstate 64/Interstate 295/Interstate 95 route alternatives are not feasible because they would add significant length to the project. Both routes also encroach upon commercial and residential areas that have become established alongside the highways, and encounter steep slopes over more miles than the proposed route. Both routing constraints would likely require Atlantic to deviate from the highway corridors, which would reduce the benefits of collocation and add additional mileage to the route, as well as additional environmental impact. Therefore, we have eliminated these routes from further consideration.

Numerous commentors, as well as FERC Staff, requested that an alternative route be evaluated that would place a portion of the pipeline route within or adjacent to the U.S. Highway 250 corridor, thereby reducing the need for disturbance in greenfield areas. The U.S. Highway 250 Route Alternative is 22.2 miles shorter than the proposed route. However, Atlantic has advised that construction along the U.S. Highway 250 route is not feasible due to the steep, mountainous terrain and highway switchback turns that follow contours and cross side-slopes. Atlantic would likely need to make route adjustments that deviate from the highway up and over ridgelines that would increase the length and reduce the benefits of

collocation. Because many portions of the road are alongside waterbodies, Atlantic would likely need to construct parallel to the waterbodies (which is not desirable, and indeed is contraindicated by the FERC *Procedures*), or cross waterbodies in numerous locations, which would increase the potential for erosion and sedimentation impacts from water flowing downhill across the construction right-of-way and into the waterbody. This would also make compliance problematic with section V.B.3 of the FERC *Procedures*, which state that the route is to be designed to minimize stream crossings and that the company should maintain at least 15 feet of undisturbed vegetation between the waterbody and construction right-of-way. The alternative is also similar to the former route through the MNF and GWNF; therefore, it would likely cross areas with similar habitats and special protections that led to the FS decision to not approve that route. Finally, U.S. Highway 250 travels through Huttonsville, Durbin, and Bartow, West Virginia; and Monterey, McDowell, Head Waters, West Augusta, Lone Fountain, and Churchville, Virginia. Atlantic would seek to avoid these commercial and residential developments, which would increase the overall length of the alternative. Although commentors have suggested that collocating with this existing right-of-way would reduce impacts on landowners, it would merely transfer impacts from one set of landowners to another, while increasing the overall length of the route (and therefore the environmental disturbance), adding impacts on residential and commercial areas, and introducing constructability concerns.

Numerous commentors also requested that an alternative route be evaluated that would place a portion of the pipeline route within or adjacent to the Interstate 95 corridor, thereby reducing the need for disturbance in greenfield areas. The Interstate 95 route alternative would be a total of 17.7 miles shorter than the corresponding segments of AP-1 and AP-2 mainlines. A preliminary examination of this route appears to offer the opportunity for significant environmental benefit. However, the Interstate 95 corridor is highly developed in this area as it passes through or near Roanoke Rapids, Rocky Mount, Wilson, Selma, Smithfield, Benson, Dunn, and Fayetteville, North Carolina. About 50 entry/exit ramps are present along this stretch of the highway, and large segments of greenfield corridor would be necessary to avoid these developed areas (gas stations, restaurants, industrial or commercial facilities, etc.), which would increase the length of the pipeline and reduce or eliminate the benefits of collocation. Furthermore, we note that Atlantic's proposed route is already collocated along this stretch of the AP-2 mainline near Fayetteville.

The DOT, Federal Highway Administration (FHA) has historically prohibited installation of utilities within medians and rights-of-way of access-controlled highways. However, FHA policy has been revised recently that permits states to determine if utility facilities can be placed within these rights-of-way (FHA, 2014). In West Virginia, the West Virginia Department of Transportation (WVDOT) has established a policy for utilities, except for telecommunications facilities, that prohibits the longitudinal installation of utilities within controlled-access highway rights-of-way (WVDOT, 2007). Similarly, the Virginia Department of Transportation has instituted policies that prohibit the longitudinal installation of utilities within controlled access highway rights-of-way except in strictly defined situations that would likely not apply to natural gas pipelines (i.e., parallel installations that do not involve tree removal or severe tree trimming) (Virginia Department of Transportation [VDOT], 2011). We find that these factors, combined with the constructability and human impacts noted above for all highway alternatives, would not provide a significant environmental advantage, and we do not recommend that they be incorporated as part of the project.

3.3.4 National Forest Route Alternatives

3.3.4.1 National Forest Avoidance Route Alternatives

A significant factor in siting ACP was the location at which the pipeline would cross the ANST. In the general project area, the ANST is located on lands managed by either the NPS or FS. The NPS has indicated that it does not have the authority to authorize a pipeline crossing of the ANST on its lands. Instead, legislation proposed by Congress and signed into law by the President would be necessary to allow the NPS the authority to review, analyze, and approve a pipeline crossing of the ANST on its lands. Because

of this legislative process, Atlantic considered locations where the ANST was located on lands acquired and administered by the FS, which significantly constrained the pipeline route and severely limits opportunities for avoiding and/or minimizing the use of NFS lands.

The proposed crossing of the MNF and GWNF received a considerable amount of comment and criticism from stakeholders, and accordingly, resulted in several evaluated route alternatives and variations. Numerous stakeholders requested that the pipeline be routed to avoid NFS lands altogether. Routing ACP to the south of the MNF and GWNF would increase the pipeline route by about 43 miles. Generally, as the length of a pipeline route is increased, the amount of environmental impacts on various resources are concurrently increased. However, we acknowledge that a shorter pipeline route could conceptually have significantly greater qualitative impacts on sensitive resources than a longer route, which could make the longer route preferable. In this instance, we have not identified or received any information that suggests the shorter pipeline route through the National Forests has significantly greater impacts on sensitive resources than the alternative, but acknowledge that ground resource surveys have not been conducted. Therefore, as currently analyzed, we do not recommend that an alternative south of the National Forests be incorporated as part of the project.

A route alternative to the north of the MNF and GWNF, along with other federal lands such as the Shenandoah National Park and Canaan Valley National Wildlife Refuge, would be approximately 15 miles longer than the corresponding segments of ACP and SHP. Similar to routing south of the National Forests, we do not find that avoidance of the National Forests would provide a significant environmental advantage when compared to the shorter proposed pipeline route through the National Forests. We also acknowledge that although the route would avoid designated National Forest lands, many of the same forest habitats and waterbodies would be crossed by the alternative, along with similar mountainous terrain. Therefore, we do not recommend that it be incorporated as part of the project.

3.3.4.2 Former National Forest Route

Atlantic has analyzed and adopted numerous route alternative and variations within the National Forests since the pre-filing process was initiated in November 2014. The most notable of these route adoptions occurred in March 2016 when Atlantic filed an amended FERC application and adopted the major route alternative entitled GWNF6. Atlantic adopted the GWNF6 route after the FS stated it would not approve Atlantic's former route through the National Forests. Specifically, the FS issued a letter to Atlantic on January 19, 2016, stating Atlantic's route did not meet the minimum requirements of initial screening criteria found in 36 CFR 251.54(e)(1)(i) and (ii), the route included inconsistencies with Forest Plan direction, and that Atlantic must develop and evaluate system and/or route alternatives that avoid the Cheat, Back Allegheny, and Shenandoah Mountains, and Cow Knob salamander habitat. When compared to Atlantic's originally proposed route, which included three HDD crossings that were designed to drill under the majority of Cow Knob salamander habitat, the GWNF6 route is generally 15 miles south of its former location through the National Forests (see figure 3.3.4-1).

Atlantic began civil, environmental, and cultural resources surveys of the GWNF6 route in spring and summer 2016. Through these surveys, discussions with private landowners, and continued consultation with the FS, Atlantic made several small modifications to the GWNF6 route to address stakeholder concerns and avoid resources. We have found Atlantic's adoption or rejection of these route modifications acceptable and have identified the adopted modifications in table 3.5-1; the associated environmental impacts of these adopted modifications are included as part of the overall analysis in section 4 of this EIS. Figure 3.3.4-1 depicts Atlantic's current and preferred route through the National Forests in relation to Atlantic's former route through the National Forests.

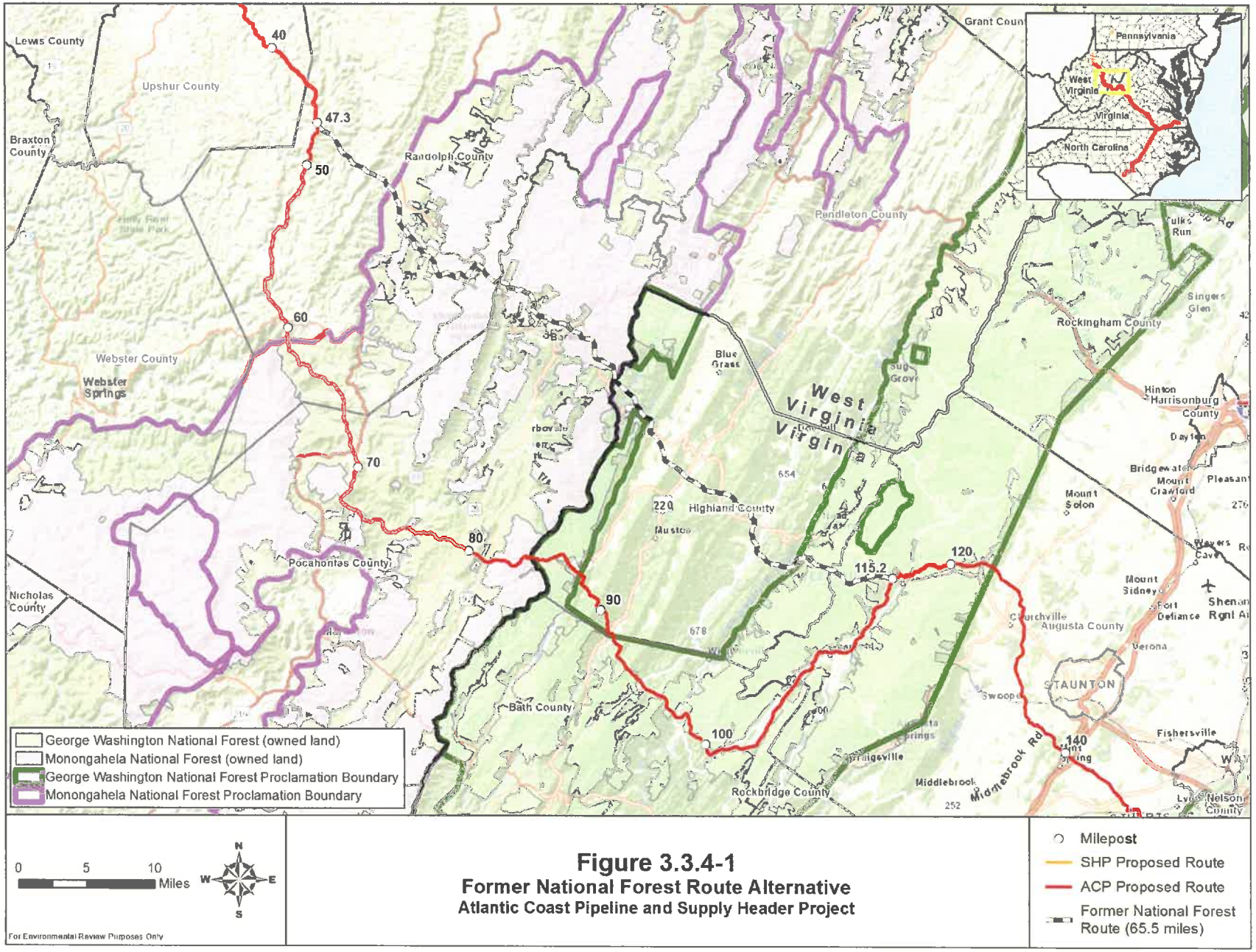


Figure 3.3.4-1
Former National Forest Route Alternative
Atlantic Coast Pipeline and Supply Header Project

Because Atlantic adopted the GWNF6 route, we have received several comments suggesting Atlantic's former route through the National Forests is preferable to the currently proposed route. While Atlantic's current route is 31.8 miles longer than the former route, and may inherently have more generalized environmental impacts than the former route (i.e., forest clearing, waterbody crossings, karst topography, steep slope construction, private landowners affected, and air emissions, among other factors), the FS' January 19, 2016 letter indicated that the FS could not approve the former route because of impacts on highly sensitive resources and because the former route would not be consistent with Forest Plan direction. Therefore, we find that Atlantic's originally proposed route through the National Forests would not meet the project objective (essentially resulting in the no-action alternative), and we do not recommend that it be incorporated as part of the project.

3.3.4.3 Appalachian National Scenic Trail and Blue Ridge Parkway Contingency Crossing

Atlantic is proposing to cross the BRP and ANST using the HDD crossing method. In this area, the ANST is located on lands acquired and administered by the FS. Figure 3.3.4-2 depicts the location of the proposed HDD and contingent direct pipe workspaces and entry/exit locations. The proposed entry workspace for the HDD is about 2,500 feet south of the BRP and the exit workspace would be about 1,300 feet north of the ANST. These workspaces would be located on private lands; therefore, the HDD method would not result in land disturbances within the GWNF or on land administered by the NPS.

Atlantic and its drilling consultant, J.D. Hair and Associates, have completed a geotechnical subsurface investigation at the HDD crossing location and have determined the proposed drill path would be constructed primarily through granodiorite bedrock and metamorphosed basalt. While completing a 4,639-foot-long HDD through these substrates is time consuming, the ability to maintain structural integrity of the drill hole and complete the drill is increased. However, we acknowledge that there is some inherent risk with the HDD method and unknown factors can cause a HDD to fail, and alluvium at the entry and exit locations could complicate the drilling process. If the proposed HDD fails, Atlantic has identified contingency crossing options[2] that it would implement to complete the crossing of the BRP and ANST as described below.

Atlantic's first contingency option is to realign the drill path and attempt a second HDD crossing. Atlantic would use the same entry and exit points to complete the second attempt, or would slightly shift the entry and exit positions to avoid local geologic factors that may have caused the initial drill to fail. Atlantic stated that any such shift in the entry and/or exit points would not require additional workspace or land impacts. We acknowledge that this contingency option would not result in additional significant environmental impacts; however, it would increase the duration for completing the BRP and ANST crossing.

Atlantic's second contingency option is to cross the BRP and ANST using the direct pipe method (see section 2.3.3.2). This option would require about 3,996 feet of the pipeline to be installed by standard upland construction methods up the north and south side of the hillside to the identified direct pipe entry and exit points. Figure 3.3.4-2 depicts the location of the proposed HDD and contingent direct pipe workspaces and entry/exit locations. The entry workspace would be about 600 feet south of the BRP, and the exit workspace would be about 400 feet north of the ANST. These workspaces would be located on private lands; therefore, the direct pipe method would not result in land disturbances within the GWNF or on land administered by the NPS.

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[2] Atlantic's *Contingency Plan for the Proposed Crossing of the BRP and ANST* can be found under FERC Accession No. 20160804-5169 at the following website location: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20160804-5169.

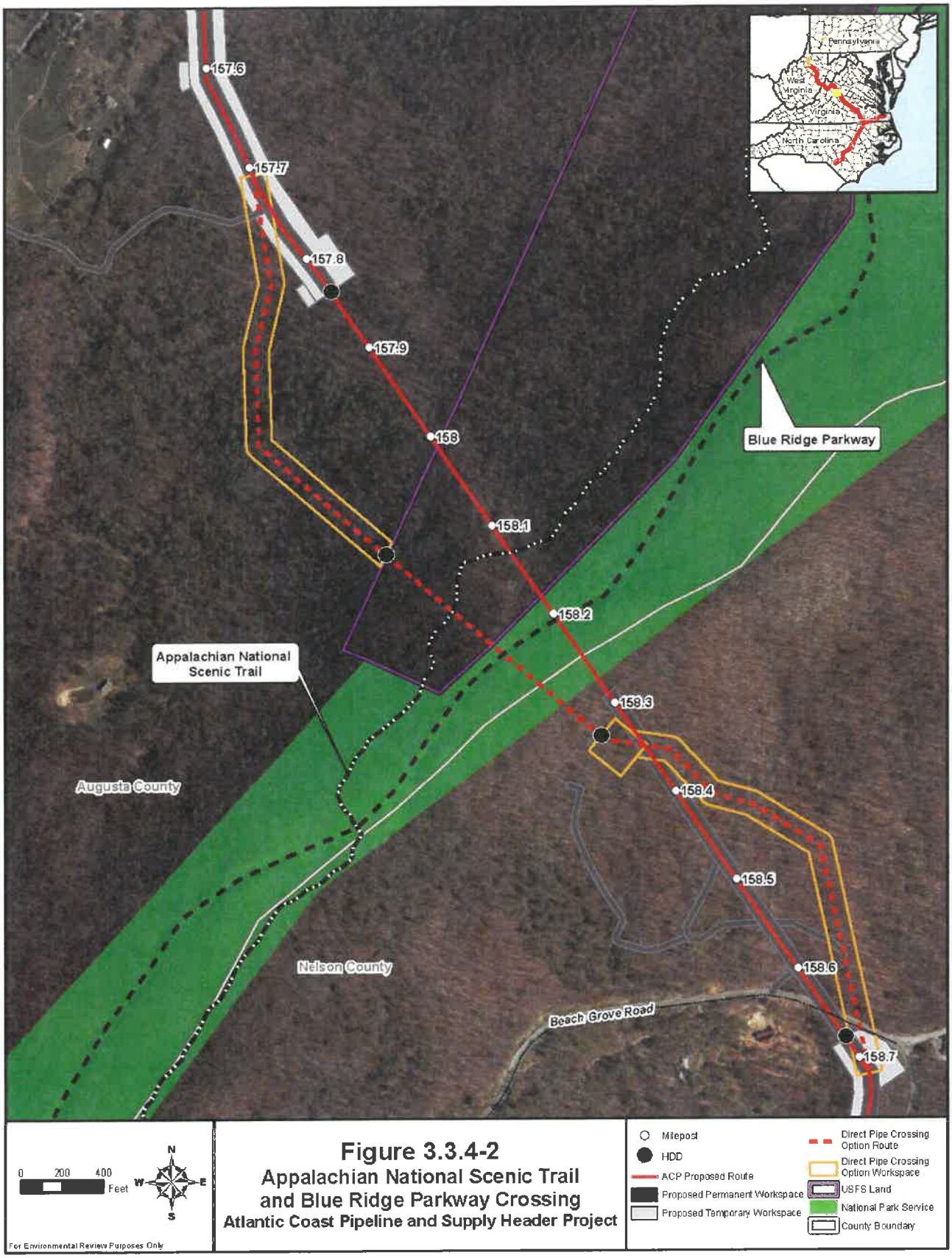

Figure 3.3.4-2
Appalachian National Scenic Trail and Blue Ridge Parkway Crossing
Atlantic Coast Pipeline and Supply Header Project

When compared to the proposed HDD crossing method, the direct pipe crossing option would result in an additional 3,996 feet (12.3 acres) of cleared pipeline right-of-way (2,124 feet [6.8 acres] on the entry side (south side) and 1,872 feet [5.5 acres] on the exit side (north side) of the mountain). Atlantic would improve an existing logging/access road off Beech Grove Road to transport equipment and personnel to the entry workspace, which would result in an additional 2 acres of forest impact. Access to the exit side would occur along the proposed pipeline construction right-of-way. Implementing this contingency option would increase the duration of project activities and the resulting air, noise, and traffic impacts from these activities near the ANST, BRP, Wintergreen Resort, and other residences and businesses in the area.

Should the Direct Pipe option be required, the pipeline right-of-way would be visible along select portions of Beach Grove Road, Mt. Torrey Road, Reeds Gap Road; by various residences and business along these roads (i.e., Fenton Inn); by residences along the northern portion of Fortunes Ridge; and from other observation points on adjacent mountain ridges. The workspaces required for the Direct Pipe option would not be visible from the BRP and ANST.

In conclusion, the Direct Pipe option would be implemented if multiple HDD attempts fail. Resulting impacts would include 12.3 acres of forest land impacts, visual impacts associated with a new pipeline right-of-way further up the mountain, and an extension of local air, noise, and traffic impacts associated with completing the Direct Pipe crossing. The Direct Pipe option would not impact NFS lands, the BRP, or the permitting requirements to cross under the BRP and ANST. While several commentors have recommended alternative routes to avoid crossing the BRP and ANST at this location (described throughout section 3), we find the implementation of the Direct Pipe option would provide a suitable contingency plan should multiple attempts of the HDD fail. The FS indicated that it believes the HDD would be feasible as proposed by Atlantic, and that the Direct Pipe option is a feasible contingency option.

3.3.5 Stuarts Draft Route Alternatives

Several stakeholders, including the Augusta County Board of Supervisors, requested an alternative route that would increase the distance between the proposed route and a three-school complex in Stuarts Draft, Virginia while avoiding source water protection zones in Augusta County. Three alternative routes were analyzed to avoid the three-school complex (see figure 3.3.5-1).

Stuarts Draft Alternative 1 would increase the overall distance of the pipeline from the three schools in Stuarts Draft. However, the alternative would be 5.7 miles longer; would affect more forest land, perennial waterbodies, wetlands, Commonwealth land, and conservation easement; and would cross an additional 3.5 miles of source water protection zone than the proposed route.

Stuarts Draft Alternative 2 would also increase the overall distance of the pipeline from the three schools and would reduce the length of forest land crossed by 0.6 mile. However, the alternative is 2.4 miles longer; would affect more perennial waterbodies, wetlands, Commonwealth land, and conservation easement; and would cross an additional 3.5 miles of source water protection zone than the proposed route.

Stuarts Draft Alternative 3 would increase the overall distance of the pipeline from the three schools. However, the alternative is 1.8 miles longer and would cross an additional 1.4 miles of source water protection zone than the proposed route. The remaining environmental considerations between the two routes are similar.

The proposed AP-1 mainline route is 0.5, 0.7, and 0.9 mile from the three schools in Stuarts Draft. We do not anticipate that construction and operation of the pipeline along the currently proposed route would have a noticeable impact on these schools. Additionally, based on the increased environmental impacts summarized above, we find that the alternative routes would not provide a significant environmental advantage and do not recommend that they be incorporated as part of the project.

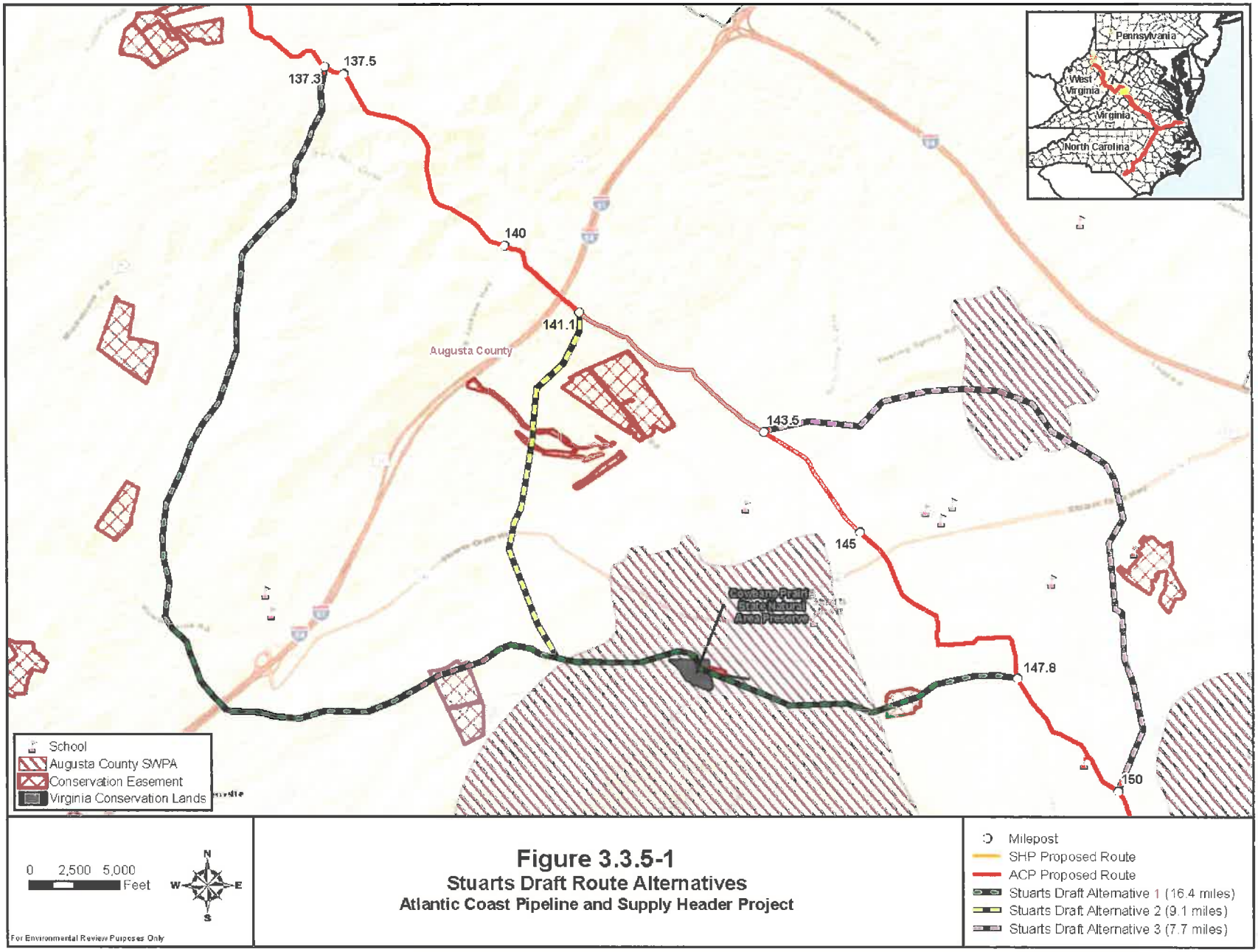

Figure 3.3.5-1
Stuarts Draft Route Alternatives
Atlantic Coast Pipeline and Supply Header Project

3.3.6 Wingina District Route Alternatives

Over the course of project planning, Atlantic considered several route options to cross the James River and route around the multiple environmental constraints in Nelson and Buckingham Counties, Virginia. Early efforts reflected Atlantic's desire to avoid the Norwood-Wingina Rural Historic District (Wingina District), which has been recommended for listing on the Virginia Landmarks Register and recommended as eligible for listing on the NRHP. During the scoping process for this EIS, FERC received comments suggesting that Atlantic develop a route that avoids the historic district. These comments resulted in the originally proposed route presented in Atlantic's application (referred to here as the Wingina District 1 Route Alternative), which completely avoids the historic district. The Wingina District 1 Route Alternative deviates from the AP-1 mainline north of James River Road near MP 183.2, where it heads east and crosses the James River WMA and the James River. Once in Buckingham County, the route alternative heads southeasterly across the Henrico Reservoir wetland mitigation site boundary and mitigation wetlands until reconnecting with the AP-1 mainline near Warminster Church Road at MP 186.6.

The Virginia Department of Game and Inland Fisheries (VDGIF) requested during a February 2016 meeting that Atlantic further evaluate an alternate route along the northern boundary of the James River WMA, which resulted in Atlantic's development of the Wingina District 2 Route Alternative. This alternative leaves the AP-1 mainline near MP 180.3 and travels southeasterly along the northeastern edge of the WMA boundary before crossing the James River. The route alternative comes within 0.25 mile of the Yogaville Satchidananda Ashram and crosses residential areas associated with this development. The alternative then heads south, skirting the edge of the Henrico Reservoir wetland mitigation property before aligning with the Wingina District 1 Route Alternative near MP 186.6. These route alternatives are depicted on figure 3.3.6-1 and impacts from the route alternatives as compared to the corresponding segment of the proposed route are presented in table 3.3.6-1.

TABLE 3.3.6-1

Analysis of the Wingina District Route Alternatives

Features	Unit	Wingina District 1 Route Alternative	Wingina District 2 Route Alternative	Proposed Route
Length	miles	6.0	6.1	6.5
Roads crossed	number	13	14	13
James River WMA land crossed	miles	1.4	0.0	1.2
Forested land crossed	miles	5.3	4.4	5.3
Wetlands crossed	miles	0.2	0.3	0.2
Intermittent waterbodies crossed	number	9	7	10
Perennial waterbodies crossed	number	2	2	2
Warminster Historic District	miles	0.3	2.7	0.9
Henrico Reservoir mitigation wetlands crossed	miles	0.1	0.0	0.0
Henrico Reservoir mitigation stream buffers crossed	miles	0.3	0.0	0.0

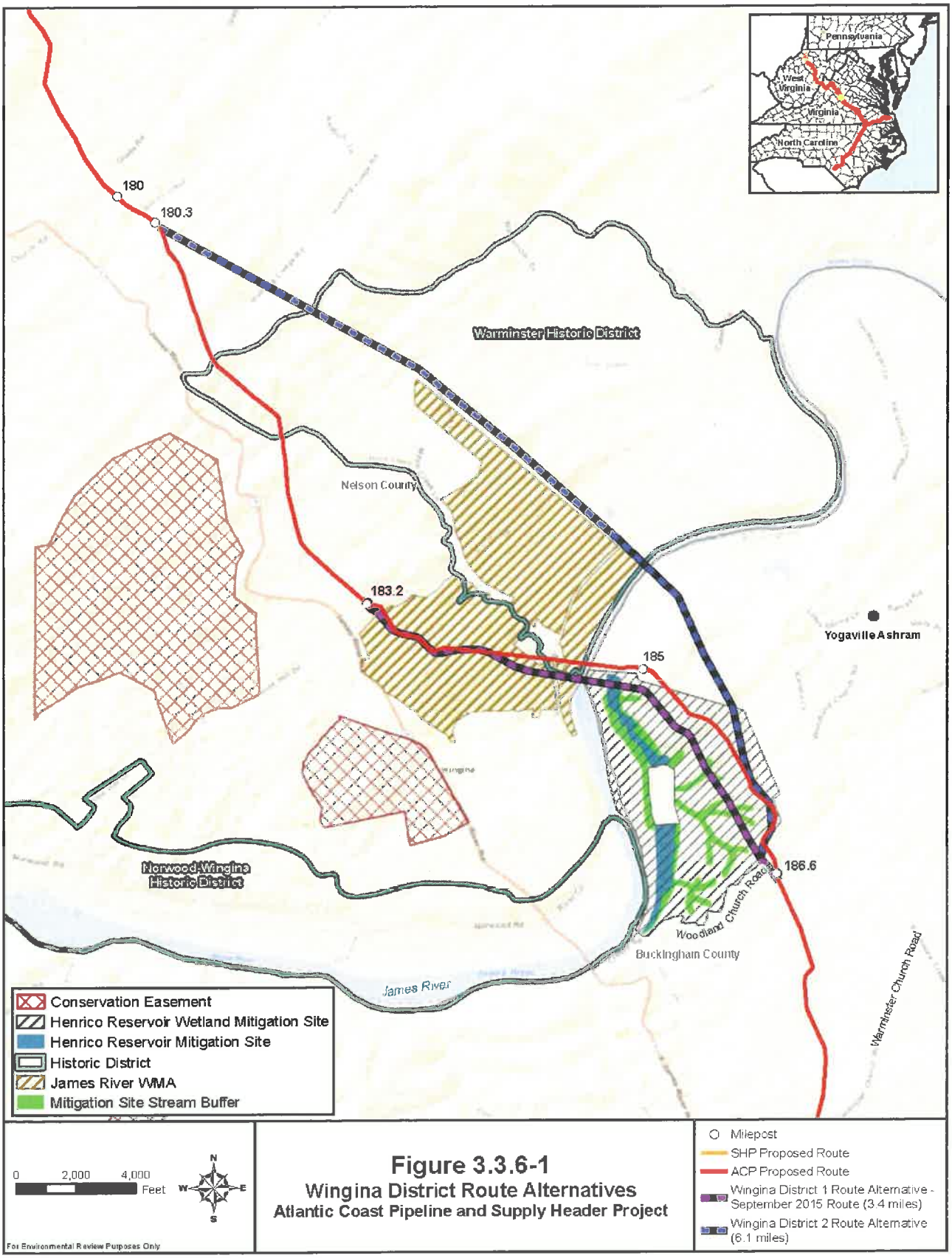

Figure 3.3.6-1
Wingina District Route Alternatives
Atlantic Coast Pipeline and Supply Header Project

The lengths of the Wingina District 1 and 2 Route Alternatives are 0.3 and 0.4 mile shorter than their corresponding segment of the proposed route, respectively. All routes cross a similar number of wetlands, waterbodies, and roads. Impacts on the James River would be avoided by all routes through Atlantic's use of the HDD method. The Wingina District 2 Route Alternative baseline route crosses less forested land than Wingina District 1 Route Alternative or the proposed route. The Wingina District 2 Route Alternative would have the greatest impact on the Warminster Historic District; impacts on the district's features near the James River would be avoided by use of the HDD method along the proposed route or Wingina District 1 Route Alternative. In September 2015, the Virginia Department of Historic Resources (VDHR) determined that this area was eligible for listing on the NRHP because of the archeological remains of Monacan Indians and African Americans.

Atlantic's proposed route optimizes the crossing of the Henrico Reservoir wetland mitigation site as compared to the Wingina District 1 Route Alterative. The James River HDD has been designed to travel under the mitigation wetlands, which would avoid impacts; however, there would still be clearing and trenching activities across the stream buffers. The proposed route would not cross any of mitigation wetlands or stream buffers but would still cross the site boundaries, which we find appropriately mitigates the impacts on this site.

The proposed route crosses both wooded uplands and wooded bottomland along the James River within the WMA. The route crosses a railroad, Midway Mills Lane, and the James River Loop trail within the WMA. The stretch of the James River along the WMA attracts anglers, and a boat ramp lies about 0.5 mile downstream from the proposed crossing of the river. The VDGIF has expressed concern that the wetland and wildlife habitats along the proposed route may be more vulnerable to project impacts than other portions of the WMA.

As described in section 4.8.5.2, the VDGIF and FWS' Division of Wildlife and Sport Fish Restoration have jointly determined that, as proposed, the construction and operation of the ACP would result in interference of the authorized purposes of the restoration program and could jeopardize the VDGIF's eligibility for future grant funding. As such, the FWS recommends that Atlantic avoid the James River WMA, or replace the affected property with another property "that is at least of equal economic value and has fish, wildlife, and public use benefits consistent with the purposes of the original grant."

We received comments that there is a mausoleum and scattered unmarked graves throughout the WMA in an area approximately 60 feet from ACP construction workspace within the WMA; Atlantic has consulted with the VDHR regarding this site. The VDHR has requested that Atlantic use probing, backhoe stripping, or other methods to confirm that unmarked graves are not present outside the limits of the known mausoleum/cemetery. The area was visited by an archaeological survey team contracted by Atlantic in December 2015 to define the limits of the site based on visual observations. Atlantic would conduct additional work around the perimeter of this site to determine if unmarked graves are present and to confirm the cemetery boundaries. No burials would be excavated if identified. Atlantic would file the results of this survey with FERC, when available.

We are also aware of the efforts of Atlantic, the VDGIF, and the FWS to develop a route and construction plan through the WMA that addresses the concerns of the VDGIF. Some of these concerns include avoidance of sensitive management areas, limitations on construction timeframe and season to reduce impacts on users, reduction of impacts related to the HDD crossing of the James River, appropriate restoration of the pipeline right-of-way with shrubs and seed mixes that enhance wildlife habitat, maintenance of federal funding opportunities, and minimization of disruptions to the ongoing wildlife habitat management programs and recreational activities. We have reviewed correspondence between Atlantic and VDGIF regarding this crossing and are satisfied that both parties are working together to develop a route across the WMA that addresses the concerns of the VDGIF.

We find that the proposed route offers advantages over the Wingina District 1 Route Alternative. The proposed route appropriately mitigates environmental and human impacts through a shorter and optimized crossing of the James River WMA and an avoidance of the wetland and stream features within the Henrico Reservoir wetland mitigation site, while minimizing impacts on private landowners, nearby communities, and the Wingina and Warminster Historic Districts.

The Wingina District 2 Route Alternative, although developed in a response to minimize impacts on the WMAs and address concerns of the VDGIF, would present its own unique impacts. Routing along the northeast border of the James River WMA would increase impacts on historic structures and properties within the Warminster Rural Historic District. This alternate route also crosses the James River in proximity to the Yogaville Satchidananda Ashram, which has been designated a Historic District by the VDHR. We received several comments during project scoping concerning the proximity of the pipeline to this community; adoption of this route alternative would bring the route closer to the residential areas surrounding the main facilities.

The VDGIF has acknowledged that Atlantic and its consultants continue to work cooperatively with the VDGIF to avoid, minimize, or mitigate potential impacts related to the proposed route through the James River WMA. We anticipate that further discussion and negotiation may result in additional minor route modifications, and/or additional construction best management practices (BMPs) may be developed to address agency concerns and allow the facilities to be constructed within the WMA. Should this be the case, Atlantic would need to file a revision with the FERC that outlines any shifts in alignment or VDGIF-recommended construction and mitigation requirements. These modifications would be subject to FERC review and approval prior to Certificate issuance. If an easement cannot be secured within the WMA, a route outside the WMA may be required. Similarly, Atlantic would need to file a route revision with the FERC that outlines any shifts in alignment, along with an environmental and cultural assessment of the revision.

3.3.7 Rockfish Gap Route Alternatives

Numerous stakeholders have requested that ACP be routed through Rockfish Gap to avoid resource impacts within the greater Wintergreen area and the Rockfish Valley. Stakeholder-recommended alternatives through Rockfish Gap include Alternative 28 and Lyndhurst to Fishersville. The locations of these alternatives are provided on figure 3.3.7-1, and each alternative is analyzed below.

3.3.7.1 Alternative 28

Alternative 28 was proposed by the Friends of Wintergreen to avoid project impacts around the greater Wintergreen area and to minimize steep slope construction. Alternative 28 deviates from the proposed pipeline at AP-1 MP 134.2 and follows Highway 254 to the east for 1.8 miles to Highway 262, where it turns southeast for 4.7 miles along Highway 262 to Interstate 64. The alternative route then follows Interstate 64 southeast and crosses the BRP and the ANST at Rockfish Gap. The route then turns south into the Rockfish Valley along Highways 692 and 151, then turns south again along Highway 6 and Interstate 29 where it merges with the proposed pipeline at AP-1 MP 169.0. Alternative 28 is 39.2 miles long, compared to the corresponding 34.6-mile-long segment of the proposed ACP.


120
134.2
140
147.4
160
168.9
180
200
215.2
220
250
340
STAUNTON
Fishersville
Rockfish Gap
Crozet
Albemarle County
Augusta County
Greenville
STUARTS DRAFT
Middlebrook Rd
Rockingham County
Shenandoah Valley Rgnl Airport
Charlottesville Albemarle Airport
Louisa County
Fluvanna County
Nelson County
Amherst County
Buckingham County
Cumberland County
Appomattox County
Prince Edward County
Campbell County
LYNCHBURG
MADISON HEIGHTS
Lynchburg County
Compressor Station 2
Pennsylvania
West Virginia
Virginia
North Carolina
0 5 10 Miles
N
W
E
S
For Environmental Review Purposes Only
Figure 3.3.7-1
Rockfish Gap Route Alternatives
Atlantic Coast Pipeline and Supply Header Project
Milepost
Compressor Station
SHP Proposed Route
ACP Proposed Route
Alternative 28 (39.2 miles)
Lyndhurst to Farmville Alternative (75.4 miles)

The Friends of Wintergreen provided a vertical profile analysis of Alternative 28 and the corresponding segment of the proposed route, and concluded the profile along the alternative route crosses fewer steep slopes. While we concur, the analysis does not consider the amount and degree of side slope construction that would be required along Interstate 64 as it crosses Rockfish Gap. In this area, the interstate corridor has been carved into the mountainside, and extreme side-slope construction (i.e., significant grading, large workspaces, and large spoil staging areas) would be required to install the pipeline adjacent to the interstate. In addition, residential and commercial development along Highways 254, 151, 6, and Interstate 64 would prevent the installation of a 42-inch-diameter pipeline in many areas. Therefore, the alternative route would have to be modified in many areas to avoid construction constraints, which reduces the collocation advantages that this route could offer.

Completion of a HDD or bore under the BRP and ANST at Rockfish Gap is a critical component in determining the viability of alternatives through Rockfish Gap. A consultant for the Friends of Wintergreen concluded that a 500-foot-long HDD could be completed from a starting location west of the railroad tunnel. FERC staff conducted a site visit at Rockfish Gap in 2015 to review potential pipeline installation options. Based on our review, it is apparent that completion of a HDD or bore under the BRP and ANST at Rockfish Gap would be constrained by steep topography, structures, roads, bridges, a railroad tunnel, and limited locations for workspace outside of NPS lands and workspace necessary to fabricate the pull-back section of pipe, and ultimately may be infeasible.

The Friends of Wintergreen stated its concern with the location of the proposed pipeline in relation to the Wintergreen Resort road entrance. Atlantic would cross Beech Grove Road using the bore crossing method. This crossing would be limited in duration and should not affect access to the Wintergreen Resort. The Friends of Wintergreen have also expressed concerns that a pipeline explosion at or near the resort entrance could jeopardize the ability to evacuate the area, because Wintergreen Drive is the only road into or out of Wintergreen Resort. Because the pipeline would be constructed and operated in accordance with federal regulations and federal oversight, we conclude that constructing and operating the pipeline facilities would not significantly impact public safety.

The Friends of Wintergreen, along with other stakeholders, have expressed concerns that the visual impact of the temporary and permanent pipeline right-of-way would deter tourism, property development, and resort development. We conclude in section 4.9.5 that the projects would not result in significant or adverse impacts on recreational or special interest areas in Wintergreen and the Rockfish Valley. As such, and given the relative short timeframe for construction, we conclude the projects would not result in significant or adverse long-term impacts on tourism.

Based on the factors analyzed above, and the fact that Alternative 28 is 4.6 miles longer than the proposed route, we find that it would not provide a significant environmental advantage and do not recommend that Alternative 28 be incorporated as part of the project. It should be noted that Alternative 28 would cross the ANST on NPS-administered lands, and the Congressional and Presidential approval process that would be required to construct the alternative across the ANST (see section 3.3.4.1, above) was not a significant factor in our decision.

3.3.7.2 Lyndhurst to Farmville Alternative

Subsequent to its recommendation for Alternative 28, the Friends of Wintergreen recommended an additional alternative that would utilize the Interstate 64 and Rockfish Gap corridor to avoid the Wintergreen area (see figure 3.3.7-1). This Lyndhurst to Farmville Alternative deviates from the proposed pipeline near AP-1 MP 148 and heads northeast through the city of Lyndhurst to the Interstate 64 corridor. The route then turns west and follows the Interstate 64 corridor and an existing railroad right-of-way until it intersects with the Dooms/Bremo electric transmission line near Yancey Mills. The alternative then

travels about 32 miles along the transmission corridor to Weber City and heads south along the electric transmission corridor to the intersection of the proposed pipeline at AP-1 MP 215.0 north of Farmville. The Lyndhurst to Farmville Alternative is 75.3 miles in length compared to the corresponding segment of the proposed ACP, which is 67.6 miles long.

The Lyndhurst to Farmville Alternative would substantially increase the amount of collocation with existing road and utility rights-of-way. However, the alternative would need to be modified to avoid construction constraints within Lyndhurst and along the Interstate 64 corridor. As previously stated in section 3.3.7.1, completion of a HDD or bore under the BRP and ANST at Rockfish Gap is constrained and likely impractical. Although the alternative would increase collocation with existing road and utility rights-of-way, we find that the additional 7.7 miles of length and construction constraints would not provide a significant environmental advantage. Additionally, because constructing and operating the pipeline facilities would not significantly impact public safety or adversely affect tourism, and we find the proposed route acceptable and do not recommend that the alternative be incorporated as part of the project. Similar to above, the Congressional and Presidential approval process that would be required to construct the alternative across the ANST was not a significant factor in our decision.

3.3.8 Love's Gap Alternatives

Similar to the Rockfish Gap alternatives, we received several comments that ACP should be routed through Love's Gap to avoid resource impacts within the greater Wintergreen and Rockfish Valley area. Three primary alternatives were proposed through Love's Gap to address these concerns: Love's Gap Highway 56, Lyndhurst to Elma, and GWNF6 Route 56. The locations of these alternative are shown on figure 3.3.8-1, and each alternative is analyzed in the following subsections.

3.3.8.1 Love's Gap Route 56 Route Alternative

At AP-1 MP 157.1, the Love's Gap Route 56 Alternative heads southwest along Highway 814 through a slightly rising valley to the BRP. The alternative crosses the BRP near Campbells Mountain Road and descends to the south along Highway 814 to the intersection of Highway 56. Following Highway 56 to the south, the alternative crosses the ANST along a FS scenic corridor and continues along Route 56 for approximately 6 miles. After crossing Highway 151, the alternative continues east for approximately 12.6 miles through relatively flat terrain and intersects the proposed pipeline at AP-1 MP 177.0. The Love's Gap Route 56 Alternative is 27.2 miles long, compared to the corresponding 20.3-mile-long segment of the proposed ACP.

The Route 56 corridor through Love's Gap is surrounded by mountainside, the Tye River, and several residences that line the road corridor. The combination of these constraints would make installation of a 42-inch-diameter pipeline along Highway 56 impractical. Therefore, the alternative would need to be modified and shifted to side-slope or ridgeline construction adjacent to the highway corridor, eliminating some benefits associated with collocation. The shift away from the Highway 56 corridor may also cause the alternative to cross portions of either the Priest Wilderness Area or Three Rivers Wilderness Area. The alternative would also require separate HDDs and/or bores under the BRP and the ANST, and up to six crossings of the Tye River. Because of these technical constraints and environmental impacts, and the fact that the route alternative is 6.9 miles longer, we find that it would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project.

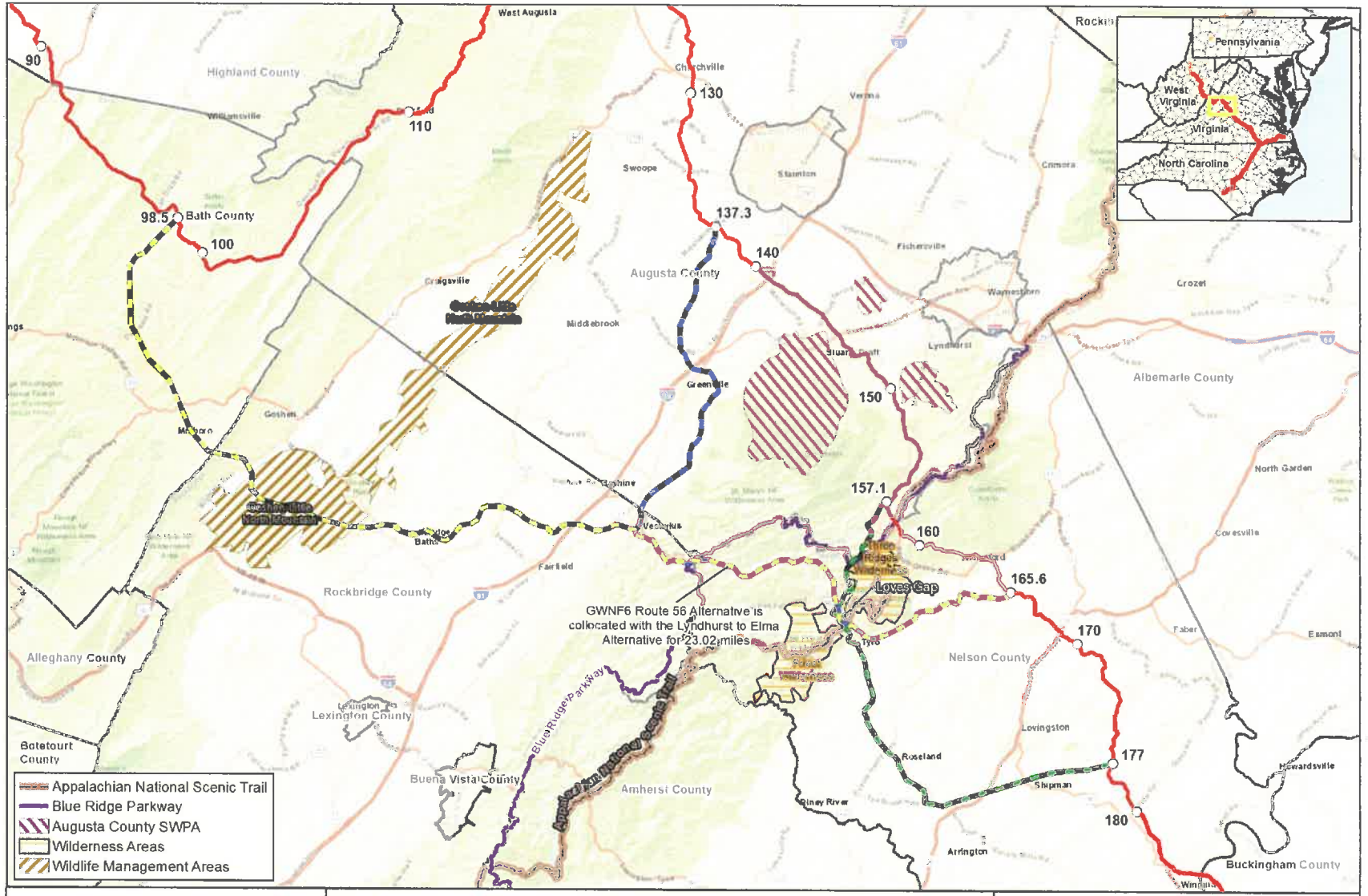

Figure 3.3.8-1
Loves Gap Route Alternatives
Atlantic Coast Pipeline and Supply Header Project

3.3.8.2 Lyndhurst to Elma Route Alternative

The Lyndhurst to Elma Route Alternative deviates from the proposed route at AP-1 MP 137.3 and heads south through Augusta County, Virginia, across Interstate 64 and north of the city of Greenville before turning east south of Steeles Tavern. The route alternative then travels east across the BRP before joining the route of the Love's Gap Highway 56 Alternative at Love's Gap and a crossing of the ANST. Then, it proceeds east and northeast across Nelson County, Virginia before rejoining the proposed route near AP-1 MP 165.6. The Lyndhurst to Elma Route Alternative is 40.6 miles long, compared to the corresponding 27.7-mile-long segment of the proposed ACP.

As with the Love's Gap Route 56 Route Alternative presented in section 3.3.8.1, the Lyndhurst to Elma Route Alternative would face significant constructability concerns through Love's Gap that would require a route adjustment that would cross portions of either the Priest Wilderness or Three Rivers Wilderness, as well as separate HDDs and/or bores under the BRP and the ANST, and up to six crossings of the Tye River, which is known to contain sensitive mussel species. The alternative also would be 12.9 miles longer than the corresponding segment of the proposed route. Because of these technical constraints and environmental impacts associated with the additional length, and because the proposed route would not significantly impact public safety or adversely affect tourism, we find that the Lyndhurst to Elma Route Alternative would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project. It should be noted that the regulatory process that would be required to construct the alternative across the ANST was not a significant factor in our decision.

3.3.8.3 GWNF6 Route 56 Route Alternative

The GWNF6 Route 56 Route Alternative deviates from the proposed route at AP-1 MP 98.5 in Bath County, within the GWNF. It follows an existing transmission line corridor south and west past the towns of Millsboro, Rockbridge Baths, and Vesuvius before joining the Lyndhurst to Elma Route Alternative near Steeles Tavern. The route alternative then travels east across the BRP before joining the route through Love's Gap, across the ANST, and east and northeast across Nelson County, Virginia before rejoining the proposed route near AP-1 MP 165.6. The GWNF6 Route 56 and the Lyndhurst to Elma Route Alternatives are collocated here for approximately 23.0 miles. The GWNF6 Route Alternative is 60.2 miles long, compared to the corresponding 75.0-mile-long segment of the proposed ACP.

As with the Love's Gap Route 56 Route Alternative presented in section 3.3.8.1 and the Lyndhurst to Elma Route Alternative presented in section 3.3.8.2, the GWNF6 Route 56 Route Alternative would face significant constructability concerns through Love's Gap that would require a route adjustment that would cross portions of either the Priest Wilderness or Three Rivers Wilderness, as well as separate HDDs and/or bores under the BRP and the ANST, and up to six crossings of the Tye River. Although the route alternative would be 14.8 miles shorter than the corresponding segment of the proposed route, the technical constraints and environmental impacts are notable, and therefore we find that it would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project. It should be noted that the regulatory process that would be required to construct the alternative across the ANST was not a factor in our decision.

3.3.9 South of Highway 664 Route Alternative

The South of Highway 644 Alternative was proposed by the Friends of Wintergreen to avoid construction impacts and safety concerns at the entrance to Wintergreen Resort and to minimize visual impacts on Wintergreen residences and guests. The alternative is designed to relocate the BRP and ANST HDD entry workspace approximately 1,400 feet west of its current location and route the pipeline on the south side of Rockfish Valley. From this alternate HDD entry workspace, the route would traverse the Three Ridges and Horseshoe Mountains south of Highway 664 and intersect the proposed pipeline at AP-1 MP 165.6 (see figure 3.3.9-1). The South of Highway 664 Alternative is 8.6 miles long, compared to the corresponding 7.7-mile-long segment of the proposed ACP.

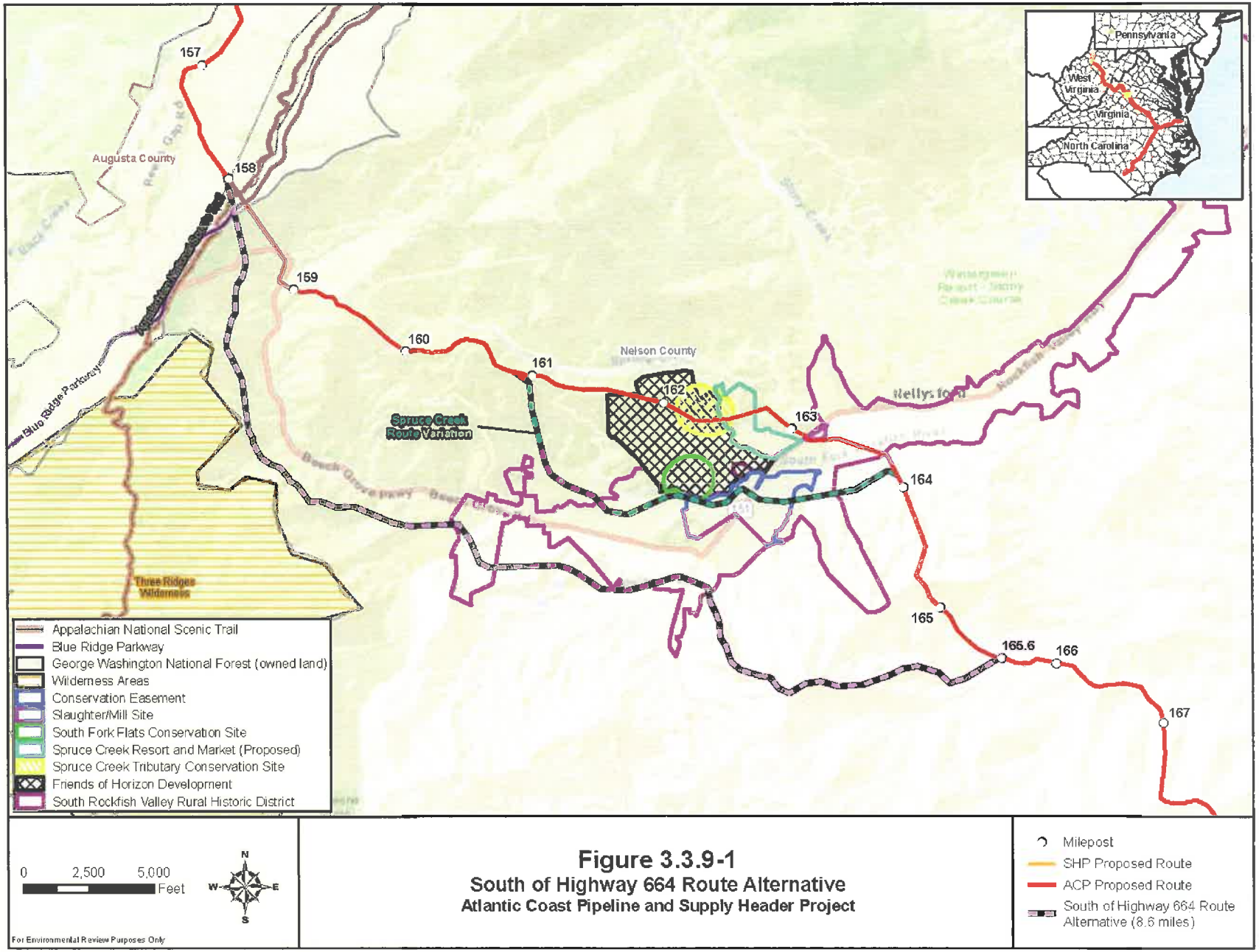

Figure 3.3.9-1
South of Highway 664 Route Alternative
Atlantic Coast Pipeline and Supply Header Project

The distance of the alternative HDD entry workspace from the Wintergreen gate would increase by 1,400 feet. While we do not believe that this change represents a significant safety advantage, it appears that the Friends of Wintergreen consider the new location superior to the currently proposed location and we have taken that into consideration.

Based on aerial and topographic data, the alternative does not reduce the amount of side slope and steep terrain construction when compared to the proposed route, and similar visual impacts would occur along the side slopes and ridgelines of the Three Ridges and Horseshoe Mountains as would occur along the proposed route's crossing of Piney and Bryant Mountains. Therefore, the alternative would merely transfer construction constraints and visual impacts from one location to another while adding 0.9 mile to the project route. Accordingly, we find that the alternative would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project.

3.3.10 Farmville Route Alternative

The Farmville Route Alternative was considered by Atlantic in its application to attempt to collocate a portion of the AP-1 mainline with existing electric transmission line corridors in Buckingham, Cumberland, Prince Edward, and Nottoway Counties, Virginia. Many stakeholders have suggested that collocating with existing power lines would generally be preferable to new greenfield corridor. The Farmville Route Alternative diverges from the proposed AP-1 mainline by traveling northeast at MP 205.4 in Buckingham County. It crosses a short stretch of greenfield before aligning with an existing transmission line for 2.2 miles east of the Willis River. It then follows this transmission line to the south, crossing the AP-1 mainline proposed route, before joining another existing transmission line that travels to the east near the Heartland Golf Club. The alternative then proceeds southeasterly alongside existing transmission lines for 24.6 miles, eventually passing north of Farmville, under the Sandy River Reservoir, north of Burkeville, and southwest of Crewe. It then heads north to follow another short stretch of greenfield to rejoin the AP-1 mainline at MP 239.8. The Farmville Route Alternative is depicted on figure 3.3.10-1, and impacts from the route alternative as compared to the corresponding segment of the proposed route are presented in table 3.3.10-1.

TABLE 3.3.10-1

Analysis of the Farmville Route Alternative

Features	Unit	Farmville Route Alternative	Proposed Route
Length (total)	miles	39.0	34.3
Primary U.S. or Commonwealth highways crossed	number	23	9
Other Commonwealth or local roads crossed	number	18	18
Adjacent to existing linear corridor facilities	miles	35.6	0.0
Commonwealth lands crossed	miles	0.1	0.0
Recreational trails crossed	number	2	0
Forested land crossed	miles	17.4	24.7
Wetlands crossed – forested/shrub	miles	1.4	1.2
Wetlands crossed – emergent	miles	0.6	0.2
Intermittent waterbodies crossed	number	51	40
Perennial waterbodies crossed	number	23	19
Battlefields crossed	miles	0.8	1.4

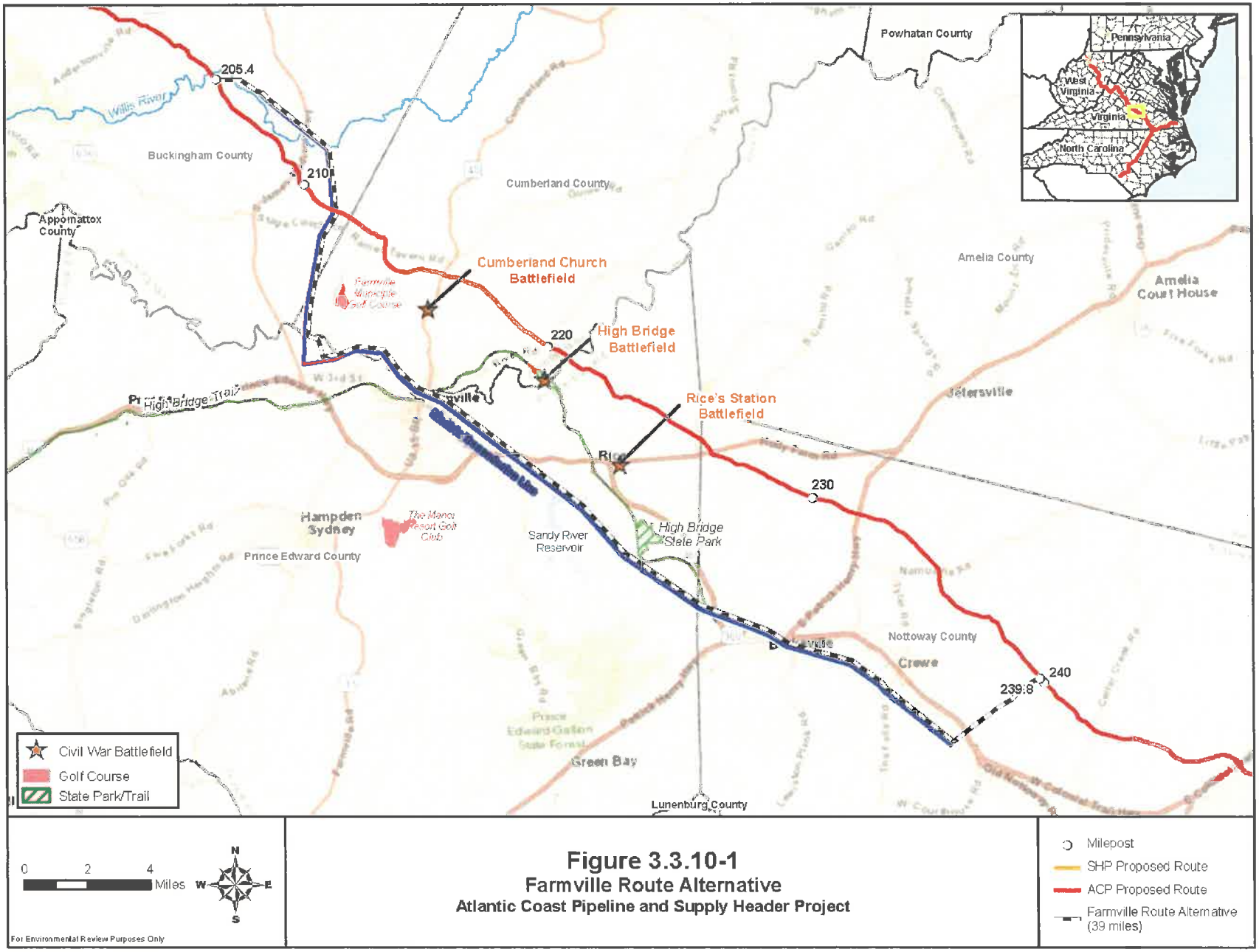

Figure 3.3.10-1
Farmville Route Alternative
Atlantic Coast Pipeline and Supply Header Project

The Farmville Route Alternative is 39.0 miles long, which is 4.6 miles longer than the corresponding portion of the proposed route. The main advantages of the route alternative are that it would cross 35.6 miles less greenfield land (i.e., it is much more collocated); 7.3 fewer miles of forested land; and would not cross the High Bridge or Cumberland Church battlefields. Adoption of the route alternative would also limit forest fragmentation in the area. Conversely, the disadvantages of this route alternative are that it would cross 15 additional perennial and intermittent waterbodies as well as the Sandy River Reservoir; 14 additional primary U.S. or state highways; the High Bridge Trail State Park; and 2 crossings of the High Bridge Trail, a rail-to-trail crushed-stone hiking and biking path within the park. Most significantly, the route alternative would encroach upon developed residential areas near Farmville, Burkeville, and Crewe, whereas the proposed route avoids developed areas.

Although collocating with existing utilities often can be a means of limiting impacts on sensitive resources and reducing forest fragmentation, it does not appear to provide an environmental advantage in this case. Rather, it is merely shifting impacts from one area and set of resources to another area and set of resources (including population developments), while increasing the length of pipeline and overall acres of disturbance. This route alternative would greatly increase the number of landowners impacted by the pipeline and residential land near the three cities. Atlantic could attempt to avoid these residential areas through minor route variations, but then the collocation benefit would be lost and additional length would be added to the project, which would increase the overall total disturbance, further reducing the advantages of the alternative. Finally, the route alternative would introduce new environmental impacts on additional waterbodies and public recreational resources that the proposed route would avoid. Based on our review, we find that the route alternative would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project.

3.3.11 Fort Pickett Route Alternatives

The Fort Pickett Route Alternatives were developed to avoid crossing the Fort Pickett Military Reservation in Nottoway, Dinwiddie, and Brunswick Counties, Virginia. Fort Pickett is a World War II-era active military facility owned by the U.S. Department of Defense and managed by the Virginia National Guard (VA Guard). Activities that take place at Fort Pickett include aerial maneuvers, live fire ranges, operation bases, urban assault training, and other facilities (VA Guard, 2016).

Atlantic originally considered three separate routes in its September 2015 application to avoid impacts on Fort Pickett (Fort Pickett 1, 2, and 3). At the time, Atlantic selected Fort Pickett 2 as its proposed route because it avoided impacts on the base and minimized impacts on nearby conservation land held by the Virginia Outdoors Foundation (VOF) and Army Compatible Use Buffer Program (ACUB) land managed in collaboration with the Ward Burton Wildlife Foundation (WBWF). After filing its application, Atlantic further modified its originally proposed route to further minimize impacts on WBWF lands. We have analyzed Fort Pickett 2 here, as well as Fort Pickett 3, an alternative proposed by commentors during the scoping period, compared to the proposed route. Fort Pickett 1 is not further analyzed here, as it resulted in the greatest impacts on VOF and WBWF lands. The Fort Pickett Route Alternatives are depicted on figure 3.3.11-1, and impacts from the route alternatives as compared to the corresponding segment of the proposed route are presented in table 3.3.11-1.

Fort Pickett 2 diverges from the AP-1 mainline at MP 250.7 and travel southerly through several miles of WBWF land and proposed VOF conservation easements before rejoining the AP-1 mainline near MP 260.4 on the southeast corner of the base. Fort Pickett 3 also diverges from AP-1 near MP 250.7 and follows existing roads along the base's eastern boundary, wholly within the base's property before returning to the AP-1 mainline near MP 260.4.

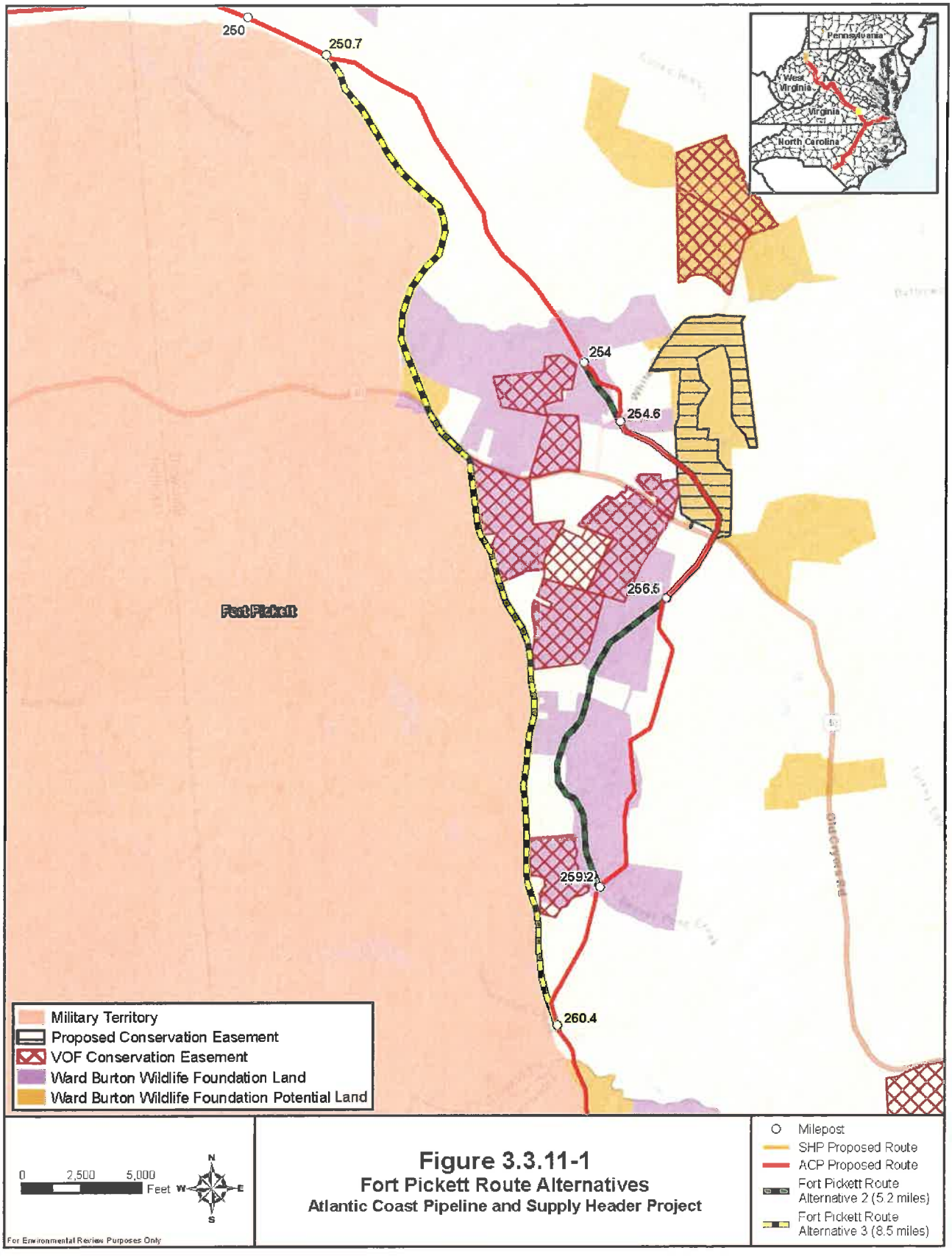

Figure 3.3.11-1
Fort Pickett Route Alternatives
Atlantic Coast Pipeline and Supply Header Project

TABLE 3.3.11-1

Analysis of the Fort Pickett Route Alternatives

Features	Unit	Fort Pickett 2 Route Alternative	Fort Pickett 3 Route Alternative	Proposed Route
Length	miles	9.7	8.5	9.7
Roads crossed	number	8	4	8
Adjacent to existing linear corridor facilities (roads)	miles	0.9	8.5	2.3
Federal lands crossed (Fort Pickett)	miles	0.0	8.4	0.0
Virginia Outdoors Foundation (VOF) – Conservation easements crossed	miles	0.7	0.2	0.7
VOF – Recently adopted conservation easements crossed	miles	0.7	0.0	0.7
WBWF – Lands crossed [a]	miles	3.2	0.4	2.6
WBWF – Potential lands crossed [a]	miles	0.7	0.5	0.7
Forested lands crossed	miles	6.1	3.0	6.2
Wetlands crossed	miles	0.2	0.1	0.4
Intermittent waterbodies crossed	number	12	6	8
Perennial waterbodies crossed	number	5	1	4

Several commentors advocated for a route through the base, while others supported a route that avoids or minimizes the crossing of the base. We find that Fort Pickett 3 offers some environmental advantages as compared to Fort Pickett 2 and the proposed route. It is 1.2 miles shorter than the proposed route, is collocated with existing roads for 100 percent of its length, impacts the fewest number of private landowners, and crosses the fewest miles of forested lands and wetlands and the fewest number of waterbodies. It also crosses the fewest number of miles of VOF conservation easements. Finally, Fort Pickett 3 crosses the fewest miles of WBWF lands, which are part of a U.S. Army program to develop buffer zones around military bases to preserve the facility's function and prevent future encroachment (see section 4.8.5.2). However, we conclude that Fort Pickett 3, despite these benefits, would result in the undue risk of operating a large-diameter natural gas pipeline within the boundaries of an active military installation. Therefore, we eliminated it from further consideration in this EIS.

Fort Pickett 2 and the proposed route, when compared to one another, have similar environmental impacts. The main advantages of Fort Pickett 2 are that it would cross fewer wetlands and marginally fewer forested lands. The advantages of the proposed route are that it would cross fewer waterbodies and WBWF lands, while being collocated with more linear corridor facilities. Although conservation easements are generally established to protect or preserve an area of land in an undeveloped state, Atlantic has indicated (and VOF has confirmed) that the easements contain language that would allow pipeline construction and operation. On November 14, 2016, the Department of the Army provided confirmation that the ACP is compatible with the purpose of the ACUB program, the routes of the pipeline do not produce a significant risk to current or planned military operations, and the WBWF may proceed with easement negotiations with Atlantic. Atlantic executed easement agreements with the WBWF on November 16, 2016.

We received comments that the pipeline should be routed further from Fort Pickett, such as collocating the pipeline along Route 40, to avoid potential pipeline damage and safety concerns related to military ordinance operations. There are about 42 residences along the 4.7-mile segment of Route 40 that would limit construction of a 42-inch pipeline adjacent to the road. Additionally, because the Department of the Army indicated that the pipeline routes do not produce a significant risk to its current or planned military operations, we have not deemed the development of additional alternatives to reduce military operation safety concerns necessary.

We find that the proposed route is compatible with WBWF land management initiatives, while being further away from the boundaries of Fort Pickett. The proposed route would also decrease the risk

that the pipeline's activities would impact the base, and vice versa. Therefore, based on our review, we find that Fort Pickett 2 would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project.

3.3.12 Optimized Brunswick 1 Route Alternative

In its application, Atlantic considered two routes (Brunswick 1 and Brunswick 2) to attempt to route the AP-1 mainline with a new 500 kilovolt (kV) DVP electric transmission line in Brunswick and Greensville Counties, Virginia. Atlantic chose to adopt Brunswick 2 as the proposed route in its FERC application. However, we asked Atlantic to work to further optimize the Brunswick 1 Route Alternative by increasing collocation with the existing transmission lines south of U.S. Highway 58. Atlantic did so and termed this the Optimized Brunswick 1 Route Alternative, which we consider in this analysis against the proposed route (i.e., Brunswick 2). We limit our analysis to the routes south of U.S. Highway 58, because the routes north of this point are identical.

The Optimized Brunswick 1 Route Alternative diverges from the proposed route near AP-1 MP 280.0 south of U.S. Highway 58 near the AP-4 lateral, and heads south for approximately 1.9 miles alongside an existing transmission line corridor, crossing the Norfolk Southern Railroad and Belfield Road. The route alternative then heads east for approximately 3.5 miles, adjacent to, and south of, an existing transmission line corridor, crossing Lewis Drive, and joining the proposed route east of Radium Road. The Optimized Brunswick 1 Route Alternative is depicted on figure 3.3.12-1, and impacts from the route alternative as compared to the corresponding segment of the proposed route are presented in table 3.3.12-1.

TABLE 3.3.12-1

Analysis of the Optimized Brunswick 1 Route Alternative

Features	Unit	Optimized Brunswick 1 Route Alternative	Proposed Route
Length	miles	5.3	4.2
Other Commonwealth or local roads crossed	number	7	6
Adjacent to existing linear corridor facilities	miles	5.3	0.0
Forested land crossed	miles	3.5	2.7
Wetlands crossed – forested/shrub	miles	0.5	0.1
Waterbodies crossed	number	11	2
Property owners impacted	number	56	47
Residences within 125 feet of pipeline	number	2	0

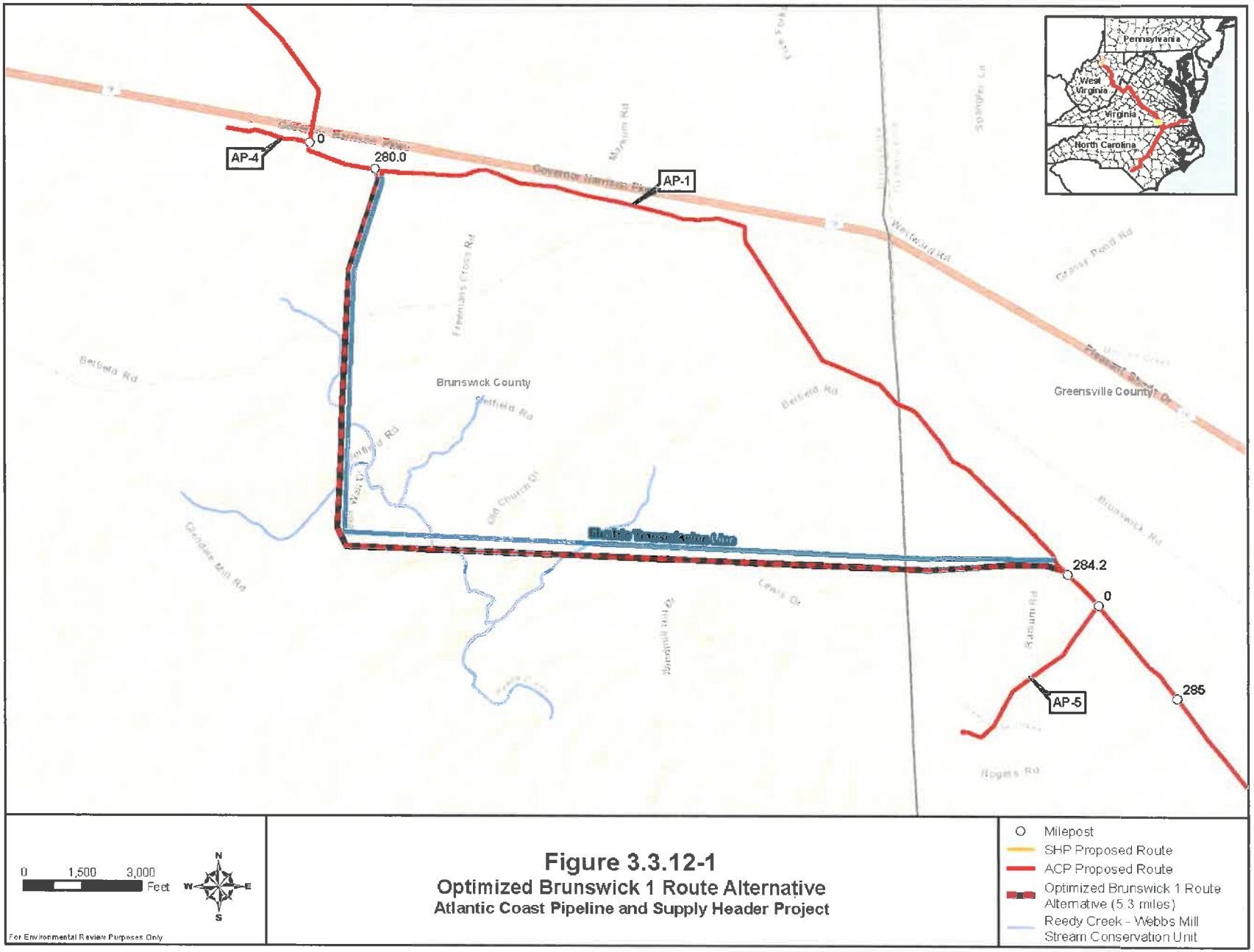

Figure 3.3.12-1
Optimized Brunswick 1 Route Alternative
Atlantic Coast Pipeline and Supply Header Project

The Optimized Brunswick 1 Route Alternative is 1.1 miles longer than the corresponding segment of the proposed route. It is collocated for the entirety of its length where the proposed route, although near U.S. Highway 58, is not close enough to claim true collocation. Despite its complete collocation with existing corridors, the Optimized Brunswick 1 Route Alternative appears to have more negative human and environmental impacts than the proposed route. The route alternative would impact nine additional property owners, including two houses within 125 feet of the pipeline, and one within 50 feet of the pipeline. It would cross nine additional waterbodies, all of which are within the Reedy Creek – Webbs Mill Stream Conservation Unit (SCU) as designated by the Virginia Department of Conservation and Recreation (VDCR). SCUs "identify stream reaches that contain aquatic natural heritage resources, including upstream and downstream buffer and tributaries associated with these reaches" (VDCR, 2016a). It is the preference of the VDCR that these conservation sites be completely avoided (see Q50 – Attachment 1; FERC Accession Number 20160113-5231); Atlantic would likely need to develop a 3-mile avoidance route here to meet the VDCR's request. The route alternative also would cross more wetlands and one previously recorded archaeological site.

Although collocating with existing utilities often can be a means of limiting impacts on sensitive resources and reducing forest fragmentation, it does not appear to provide an environmental advantage in this case for the reasons presented above. Based on our review, we find that the Optimized Brunswick 1 Route Alternative would not provide a significant environmental advantage, and we do not recommend that it be incorporated as part of the project.

3.3.13 Northampton Route Alternative

The Northampton Route Alternative was presented in Atlantic's application to increase collocation with an existing electric transmission corridor near the beginning of the AP-3 lateral in Northampton County, North Carolina. The proposed AP-3 lateral heads east from Compressor Station 3 at the Virginia/North Carolina state line towards ACP's eventual interconnect with the Virginia Natural Gas pipeline in the City of Chesapeake. The Northampton Route Alternative would involve extending the AP-1 mainline south of its current terminus at Compressor Station 3 to a new terminus and proposed compressor station site approximately 4.3 miles south of its current location, as well as increasing this section of pipe to 42 inches in diameter. The AP-2 mainline and AP-3 lateral would than initiate from this new compressor station site. The Northampton Route Alternative would then travel northeasterly along an existing DVP transmission line to connect with the current AP-3 lateral at MP 6.1. The Northampton Route Alternative is depicted on figure 3.3.13-1 and impacts from the route alternative as compared to the corresponding segment of the proposed route are presented in table 3.3.13-1.

TABLE 3.3.13-1

Analysis of the Northampton Route Alternative

Features	Unit	Northampton Route Alternative	Proposed Route
Length	miles	7.8	6.1
Other state/commonwealth or local roads crossed	number	4	7
Adjacent to existing linear corridor facilities	miles	7.8	0.0
Forested lands crossed	miles	1.4	2.6
Wetlands crossed – freshwater emergent	miles	0.1	0.0
Wetlands crossed – freshwater forested/shrub	miles	0.8	0.9
Intermittent waterbodies crossed	number	3	4
Perennial waterbodies crossed	number	2	1
The Nature Conservancy floodplain forest	miles	0.0	0.3

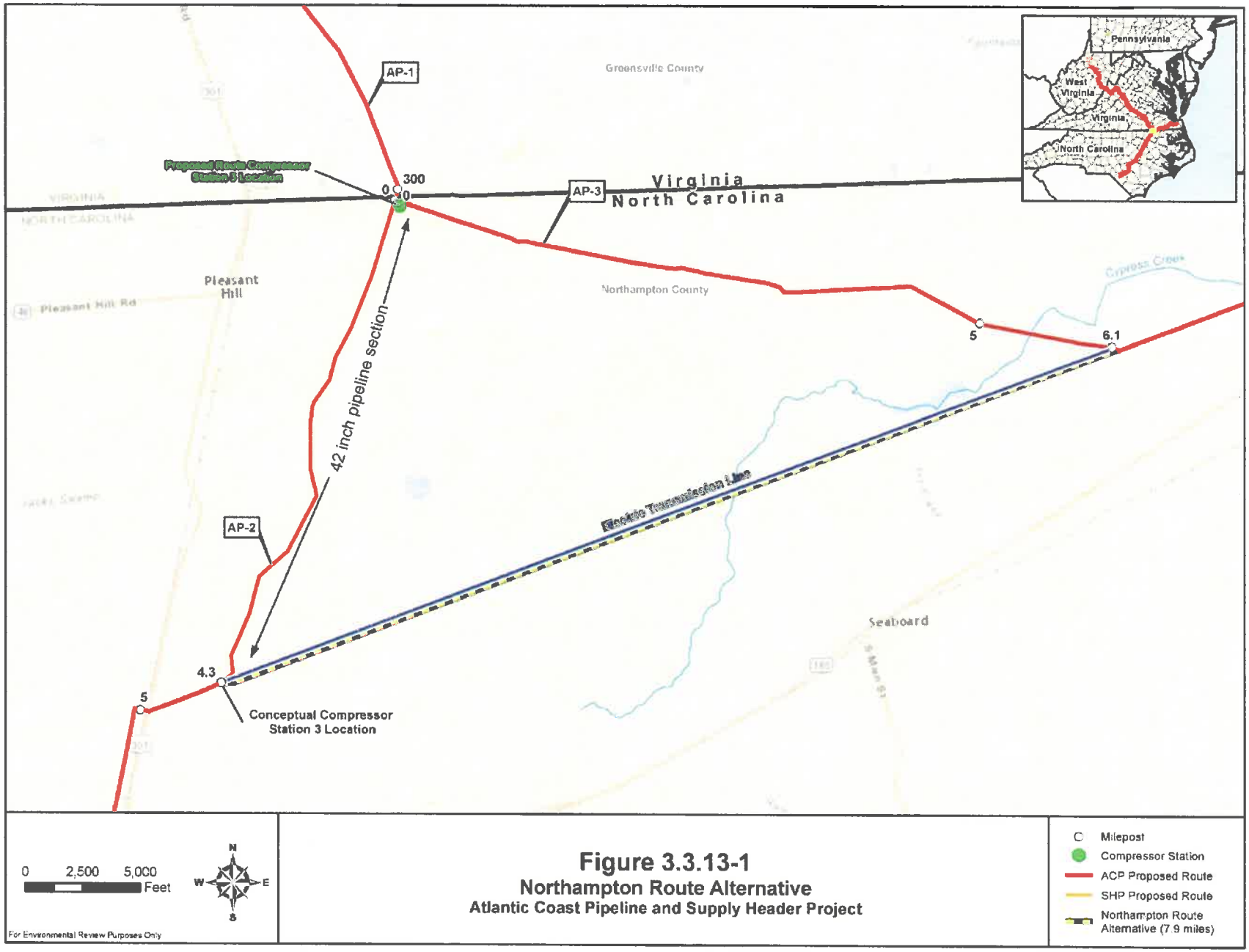

Figure 3.3.13-1
Northampton Route Alternative
Atlantic Coast Pipeline and Supply Header Project

From an infrastructure perspective, the proposed route is the shortest route; the Northampton Route Alternative would result in an additional 1.8 miles of pipeline. In addition, the larger diameter pipe used for the route alternative south of Compressor Station 3 would likely require a wider construction workspace and a marginally greater disturbance along those 4.3 miles. The Northampton Route Alternative appears to offer some minor environmental advantages: it would cross three fewer roads and 1.4 fewer miles of forested uplands, and is collocated with an existing utility corridor for 7.8 miles. It also completely avoids a new crossing of The Nature Conservancy floodplain forest, although there would still be a 0.2-mile-long crossing of this forest along the AP-2 mainline. The route alternative would, however, cross Cypress Creek one additional time, which contains the presence of the state significantly rare banded sunfish.

This route alternative would require Compressor Station 3 to be moved to a new site 4.2 miles south of the proposed site. The site of the new compressor station would be located on farmland that would be permanently converted to industrial land, and appears to have more potential sensitive noise receptors within 0.5 mile of its location than the current compressor station site. In contrast, the proposed location for Compressor Station 3 is on commercial timber land, and the landowner is amenable to the placement of the compressor station on their property.

Although collocating with existing utilities often can be a means of limiting impacts on sensitive resources, it does not appear to provide a strong enough environmental advantage in this case. The route alternative's decrease in impacts on The Nature Conservancy floodplain forests and forested areas is also notable; however, most forested areas appear to be silvicultural plots in varying stages of management. In addition, we find the current location of Compressor Station 3 to be preferable as compared to the conceptual new location. Based on our review, we find that the route alternative would not provide a significant environmental advantage and do not recommend that it be incorporated as part of the project.

3.4 ROUTE VARIATIONS

Although they can extend for several miles, route variations are different from major route alternatives in that they are usually shorter and are often designed to avoid a specific environmental resource or engineering constraint. They also typically remain within the same general area as the proposed route.

3.4.1 Spruce Creek Route Variation

The Spruce Creek Route Variation was developed in response to our request for Atlantic to evaluate an alternative route through the Rockfish Valley. We received a considerable number of comments from stakeholders within the Rockfish Valley that the pipeline should be routed to avoid several features within the Valley, including, most notably, the Spruce Creek Conservation Site, South Fork Flats Conservation Site, the Spruce Creek Resort and Market planned development, historic properties that contribute to the South Rockfish Valley Rural Historic District, Horizons Village, and the Elk Hill Conservation Easement on the south side of Rockfish Valley Highway. Stakeholders also expressed concerns about constructing the pipeline through forested areas and the visual impacts the maintained pipeline right-of-way may have on tourism in the area.

Based on these comments, we requested that Atlantic evaluate a pipeline route that optimizes the use of pasture and agricultural land in the Rockfish Valley, minimizes ridgetop and forest impacts, and avoids or minimizes impacts on cultural and historic properties, nature trails, waterbodies, the Spruce Creek Tributary Conservation Site, and planned developments. On March 10, 2016, Atlantic responded to our request and filed an evaluation of the Spruce Creek Route Variation. The variation and Atlantic's currently proposed pipeline route are shown in figure 3.4.1-1.

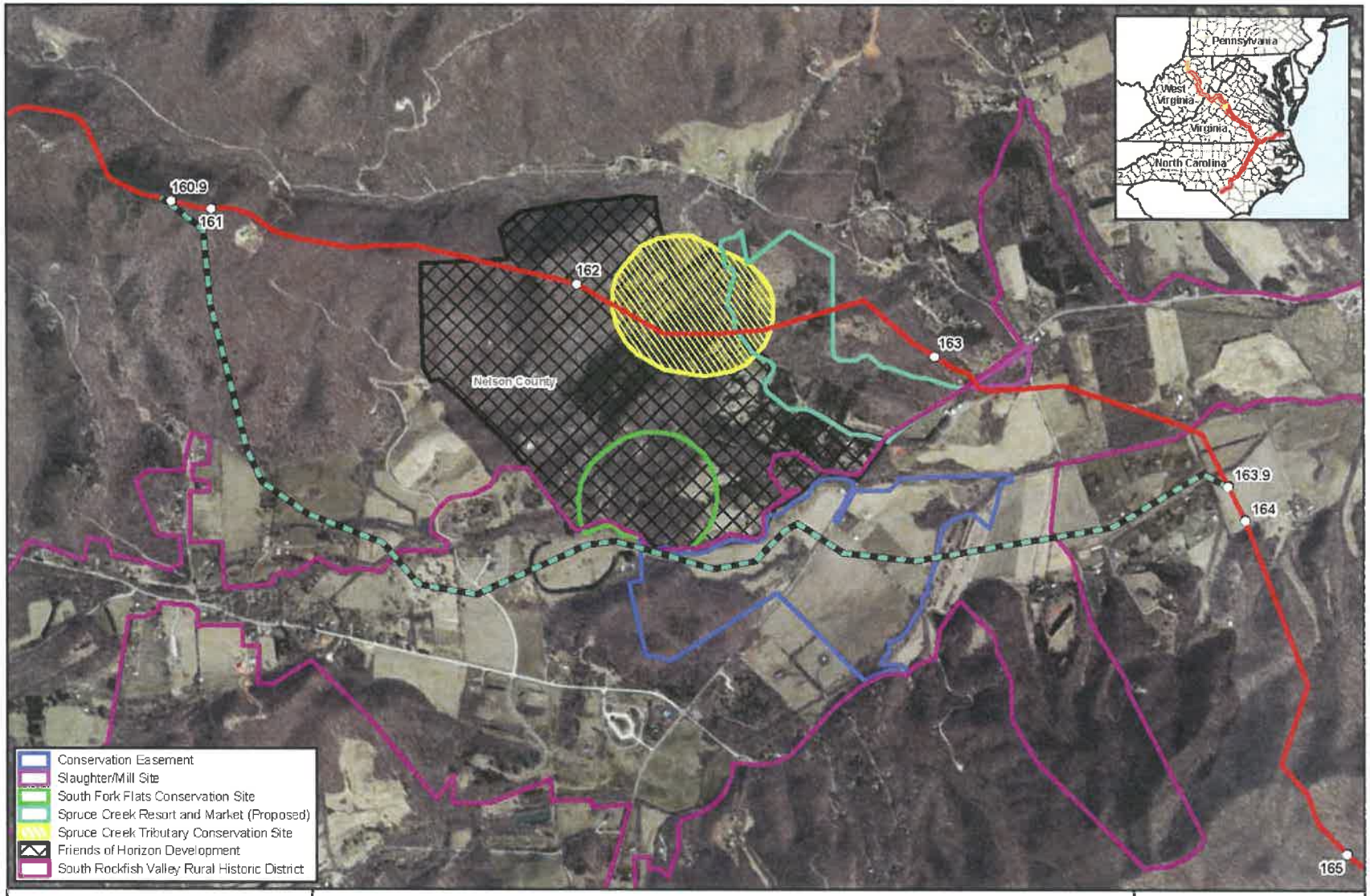

Figure 3.4.1-1
Spruce Creek Route Variation
Atlantic Coast Pipeline and Supply Header Project

On August 29, 2016, the FERC mailed letters to landowners along the Spruce Creek Route Variation and the corresponding segment of the proposed pipeline route requesting comments be filed on the route variation by September 28, 2016. Several comment letters were filed during this timeframe and are considered in our analysis, along with all other comment letters that have been filed on the docket regarding the routing in this area since the project was proposed to FERC.

Starting at AP-1 MP 160.9, Atlantic's currently proposed route heads east for 2.2 miles along the east-trending ridgeline on Bryant Mountain and enters the Rockfish Valley east of Spruce Creek. After crossing Rockfish Valley Highway, the proposed route heads southeast for 0.8 mile, crosses the South Fork Rockfish River approximately 0.4 mile east of Elk Hill Church, and heads south out of the Rockfish Valley over an eastern ridge of Horseshoe Mountain.

Relative to Atlantic's currently proposed route, the Spruce Creek Route Variation heads south off the east-trending ridgeline on Bryant Mountain for 0.8 mile and enters Rockfish Valley. At a point about 0.4 mile north of Beech Grove Road, the variation turns to the southeast and continues for 0.4 mile, crossing the South Fork Rockfish River west of Winery Lane. The variation then continues east across the valley for 2.4 miles, crossing Rockfish Valley Highway and Edgewood Drive, and then reconnects to the proposed pipeline route at AP-1 MP 163.9. A comparative analysis of environmental impacts of the proposed route and the Spruce Creek Route Variation is presented in table 3.4.1-1.

TABLE 3.4.1-1

Analysis of the Spruce Creek Route Variation

Features	Spruce Creek Route Variation	Proposed Route
General		
Total Length (miles)	3.6	3.1
Length adjacent to existing right-of-way (miles)	0	0
Human Environment		
Landowner parcels crossed (number)	15	22
Residences within 100 feet of construction workspace (number)	0	0
NFS lands crossed – Total (miles)	0	0
State/commonwealth lands crossed (number)	0	1
Spruce Creek Conservation Site Buffer (feet)	0	0.4
Planned developments (number)	0	1
Spruce Creek Resort and Market (feet)	0	0.3
Conservation easements (miles)	0.8	0
Resources		
Forested lands (miles)	0.7	2.4
Wetlands (National Wetlands Inventory) crossed (feet)	0	0
Intermittent waterbodies (number)	2	1
Perennial waterbodies (number)	2	3
Shallow bedrock crossed (acres)	0.6	1.0
Soils highly erodible by water (miles)	0.9	2.0
Steep slope (>30 percent) crossed (miles)	0.3	0.6
Moderate to high landslide incidence/susceptibility areas crossed (miles)	3.6	3.0
Karst topography crossed (miles)	0	0
South Rockfish Valley Rural Historic District crossed (length)	1.9	0.6

The Spruce Creek Route Variation is 3.6 miles long, which is 0.5 mile longer that the proposed route. The route variation would affect 15 properties compared to 22 along the proposed route; however, each route and proposed workspaces are at least 100 feet from residences. The route variation as currently designed bisects the Edgewood Park development, with the proposed centerline of the variation following a private airstrip centered in Edgewood Park. Commentors noted that the airstrip is used by landowners, by Songbird Aviation LLC, and for helicopter medical evacuations. It may be possible to route the variation to the north or south of Edgewood Park to avoid airstrip impacts, but the route would likely remain near residences of the development.

The proposed route crosses Horizons Village, a 400-acre neighborhood consisting of 40 properties. Horizons Village filed an impact assessment with FERC. This assessment, along with a field review conducted in September 2015 by FERC Staff and members of Horizons Village, has been considered in our analysis. The proposed route also crosses a 100-acre planned development known as the Spruce Creek Resort and Market, which will eventually include a resort, hotel, restaurant, and public market. This area was also reviewed by FERC Staff in September 2015, along with the conceptual drawings of the proposed development.

We note that table 3.4.1-1 indicates no wetland would be crossed by either route. National Wetlands Inventory (NWI) data, rather than field delineations, were used to make this determination. We acknowledge, based on comments received, that wetlands are likely present within the Rockfish Valley and could be crossed by either the proposed route or the route variation. We have taken this into consideration.

The proposed route crosses the conservation buffer of the Spruce Creek Tributary Conservation Site, which has been given a high biodiversity ranking as an indicator of its rarity and quality, and was established by the VDCR to protect a Central Appalachian Low-Elevation Acidic Seepage Swamp. The associated buffer that makes up the Spruce Creek Tributary Conservation Site has been deemed necessary for the seepage swamp's conservation. Comments were received regarding the avoidance of the Spruce Creek Tributary Conservation site, and a letter was received from the VDCR recommending that the conservation site be avoided.

The route variation crosses the Glenthorne Farm Stream Bank, which is comprised of 6,322 linear feet of jurisdictional stream that has been restored, enhanced, and preserved in various sections and provides compensatory mitigation for unavoidable impacts to waters of the United States. Further consultation would be required to determine whether the route variation could cross the mitigation site.

The route variation crosses slightly more land designated as moderate to high landslide incidence/susceptibility. As stated in section 4.1.7, Atlantic would construct the pipeline to comply with DOT construction and safety standards that would reduce the risk of landslides. Additionally, we do not anticipate that either route would have an adverse effect on historic structures and properties that comprise the South Rockfish Valley Rural Historic District. However, we acknowledge that we have not received all cultural survey reports for the Rockfish Valley, and cultural resources or historic properties could be identified through further field surveys and consultation with the SHPO. For instance, we have received comments from stakeholders that the old mill site located along Rockfish Valley Highway could be affected by the proposed pipeline route. Until field surveys can be completed, we cannot compare the relative impacts of the proposed route with the route variation on cultural resources or historic properties. However, we note that we would require Atlantic to avoid or mitigate all potential adverse effects to eligible or potentially eligible cultural resources or historic properties regardless of which pipeline route is selected.

We also received comments that the route variation crosses more public hiking trails than the proposed route; would impact existing businesses such as Blue Heron Farms, High View Farm and Blue

Toad Hard Cider, and a bed and breakfast; would impact agricultural and livestock practices; and would have greater tourism impacts.

The primary advantages of the proposed route are that it would reduce overall land, hiking trail and existing business impacts, landslide potential, and the length of crossing of the South Rockfish Valley Rural Historic District; and would avoid a conservation easement held by the VOF and a stream mitigation bank. The primary advantages of the Spruce Creek Route Variation are that it would reduce forest land, visual, and erodible soils impacts; reduce the number of landowners affected; and avoid the Spruce Creek Conservation site, Spruce Creek Resort and Market Planned Development, and Horizons Village. Based on the factors discussed above and information presented in the numerous comment letters filed for these routes, it does not appear that the Spruce Creek Route Variation would offer a significant environmental advantage when compared to Atlantic's proposed route and we do not recommend that it be incorporated as part of the project.

3.4.2 Westmoreland Route Variation

The Westmoreland Conservancy is coordinating with DETI to minimize impacts on two conservation easements along the proposed TL-636 pipeline route near the JB Tonkin Compressor Station.[3] Starting at TL-636 MP 3.6, Atlantic's currently proposed route deviates from an existing transmission right-of-way and heads west across Hills Church Road, crosses a tributary to Haymakers Run, heads north and east, and crosses the same tributary to Haymakers Run before terminating at the proposed terminus of the pipeline at TL-636 MP 3.8. The route variation request by Westmoreland Conservancy continues north along the transmission corridor and heads west across Hills Church Road to the terminus of the pipeline.

The variation appears to minimize crossing of conservation lands and eliminate waterbody and wetland impacts; however, we do not have field and civil survey information to fully evaluate the feasibility of the variation or determine whether the variation offers advantages that are environmentally significant. Therefore, we will not recommend that DETI adopt the route variation at this time. However, DETI should continue to study the route variation requested by Westmoreland Conservancy to determine overall feasibility and whether it would provide environmental advantages. Pending the results of further study and consultation, DETI may propose to adopt the route variation pursuant to recommended Environmental Condition No. 5. Therefore, **we recommend that:**

- **Prior to construction, DETI should continue to consult with the Westmoreland Conservancy regarding a route variation to minimize impacts on conservation easements, and should file with the Secretary documentation regarding the results of its consultations and any proposed route modifications.**

3.4.3 Valley Center Route Variation

The Valley Center Route Variation was developed in response to our request for Atlantic to evaluate an alternative route that avoids the karst and spring features near Valley Center Road (AP-1 MP 88.5). The Valley Center Route Variation leaves the baseline route at AP-1 MP 88.2 and heads southwest about 0.8 mile along the ridgeline of Middle Mountain, and turns southeast and parallels the proposed route for about 1.7 miles before rejoining the proposed route at AP-1 MP 89.7. The variation and Atlantic's currently proposed pipeline route are shown in figure 3.4.2-1.

[3] The proposed Westmoreland Conservation Variation can be found under FERC Accession No. 20170406-5147 at the following website location: http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170406-5147.

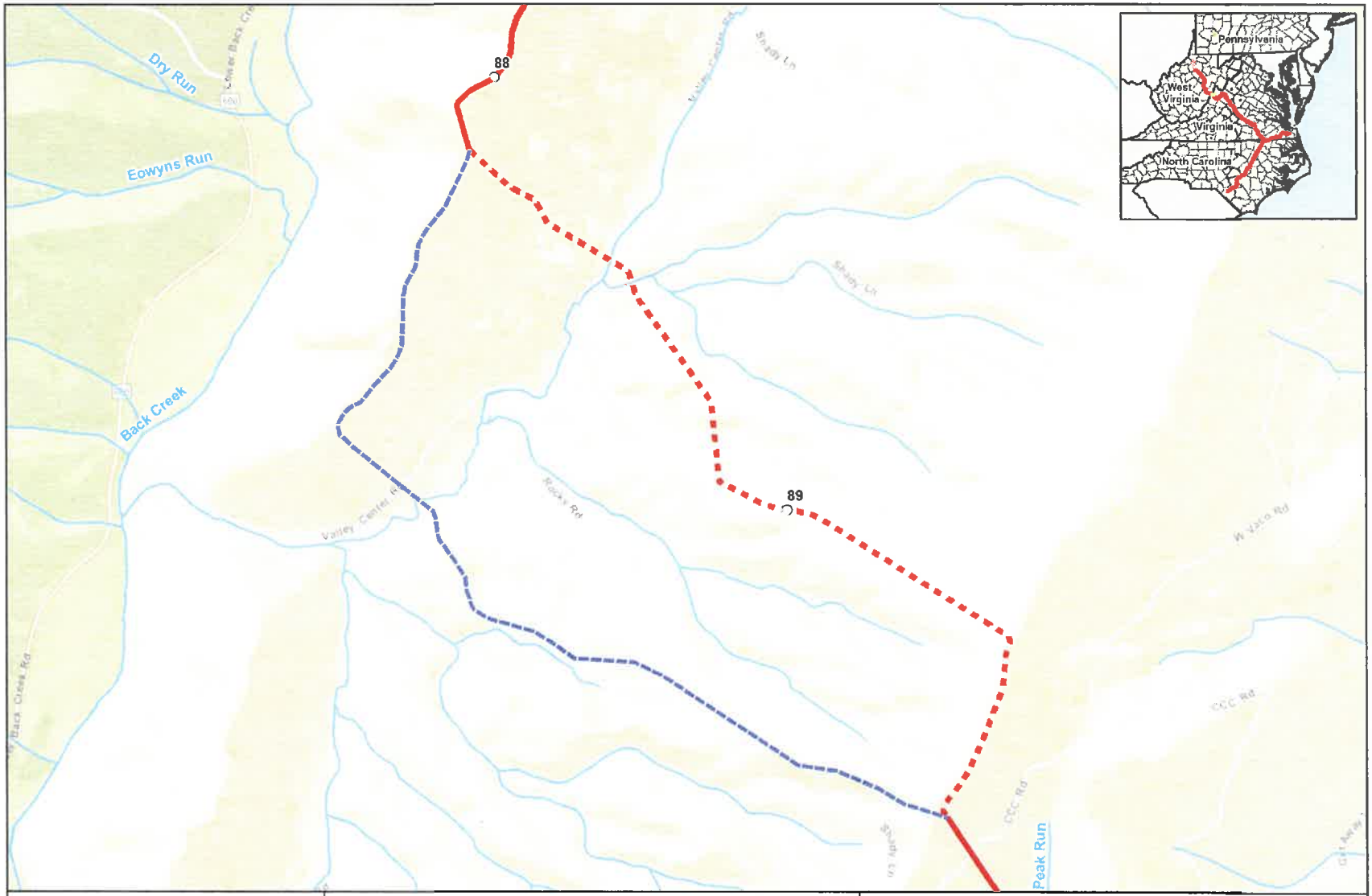

Figure 3.4.2-1
Valley Center Route Variation
Atlantic Coast Pipeline and Supply Header Project

As presented in table 3.4.2-1, the Valley Center Route Variation is 0.3 mile longer and would cross 12 landowners compared to 6 that would be crossed by the proposed route. The variation crosses more steep slope and forested land than the proposed route, but would avoid the field verified karst areas identified in Atlantic's Karst Survey Report. However, we note that karst surveys have not been completed along the variation to determine if similar features are present. We have received comments that the variation would be located within 1,000 feet of Campbell Spring, Huber Pit, Lighter Meadow, and Huber Crevice.

As discussed in sections 4.1.2.3 and 4.3.1.7, Atlantic has proposed several measures to minimize impacts on karst systems and private water sources, including the use of karst monitors, conducting electric resistivity surveys to avoid or minimize karst impacts, and monitoring water quality impacts during and after construction, as required. Because appropriate impact minimization and mitigation would be implemented, it does not appear that the Valley Center Route Variation would offer a significant environmental advantage when compared to Atlantic's proposed route and we do not recommend that it be incorporated as part of the project.

TABLE 3.4.2-1

Analysis of the Valley Center Route Variation

Features	Valley Center Route Variation	Proposed Route
General		
Total Length (miles)	2.5	2.2
Length adjacent to existing right-of-way (miles)	0	0
Human Environment		
Landowner parcels crossed (number)	12	6
Residences within 125 feet of construction workspace (number)	0	1
Resources		
Forested lands (miles)	2.2	2.0
Perennial waterbodies (number)	1	0
Soils highly erodible by water (miles)	2.5	2.2
Steep slope (>30 percent) crossed (miles)	1.1	0.6
Moderate to high landslide incidence/susceptibility areas crossed (miles)	2.5	2.2
Karst topography crossed (miles)	0.3	0.6

3.4.4 Butterwood Creek Route Variation

The Virginia Department of Environmental Quality (VDEQ) has recommended that the proposed route near AP-1 MP 249.6 is shifted to the south to reduce the number of stream crossings. Upon our review, it appears that routing the pipeline 500 feet to the south would reduce stream crossings from two to one and would not increase other environmental impacts. Therefore, **we recommend that:**

- **Atlantic should incorporate the Butterwood Creek Route Variation into its final route for the ACP. Prior to construction, Atlantic should file with the Secretary the results of all environmental surveys, an updated 7.5-minute USGS topographic quadrangle map, and a large-scale alignment sheet that illustrates this route change.**

3.5 ALTERNATIVES AND VARIATIONS PREVIOUSLY ADOPTED

Atlantic and DETI have adopted many route variations into their project designs throughout FERC's Pre-filing process and between the filing of the September 2015 application and the current

proposed routes. Many of these route adjustments were adopted without a formal alternatives analysis, because the basis for the adjustment was intuitive and practical (e.g., a slight shift in the centerline to avoid a wetland; agency preferences; landowner preferences; and survey findings). In total, 201 route adjustments were adopted, totaling approximately 199 miles. Several of the route adjustments that were adopted were identified by FERC Staff, such as the Brunswick, Progress Energy Carolinas, and Boykins alternatives, which increased collocation of proposed pipeline facilities with other utility rights-of-way by about 30 miles. Table 3.5-1 lists some of the route adjustments that have been incorporated into the proposed ACP and SHP pipeline routes and the rationale for each adjustment. Because these routes were eventually proposed as part of ACP or SHP, the associated environmental impacts are included as part of the overall analysis in section 4 of this EIS.

3.6 ABOVEGROUND FACILITY LOCATION ALTERNATIVES

We evaluated the locations of the proposed aboveground facilities to determine whether environmental impacts would be reduced or mitigated by the use of alternative facility sites. Our evaluation involved inspection of aerial photography and mapping, as well as our own field work along the proposed projects' corridor and location. In evaluating these locations, we consider: amount of available land; current land use, as well as adjacent land use; location accessibility; engineering requirements; and impacts on the natural and human environments.

3.6.1 Compressor Stations

None of the proposed or alternative compressor station sites are located on NFS lands.

3.6.1.1 SHP Compressor Station Modifications

The proposed modifications to DETI's existing compressor stations would occur at or immediately adjacent to those sites and we did not identify any significant environmental constraints with the proposed locations. Further, we did not receive comments concerning those locations. Given these considerations, alternative sites for station modifications were not evaluated.

3.6.1.2 ACP Compressor Station 1

We did not receive any comments regarding alternative sites for Compressor Station 1. Based on our evaluation of the proposed site in section 4 of this EIS, we find it to be an acceptable location, and that the proposed compressor station would not result in or contribute to significant environmental impacts. As such, we did not evaluate alternative sites for this location.

TABLE 3.5-1

Select Route Adjustments Incorporated into the Atlantic Coast Pipeline and Supply Header Project Routes

Route Adjustment	Approximate Mileposts	State	Rationale
ATLANTIC COAST PIPELINE			
AP-1 Mainline			
Hollick Run	7.4 to 8.4	WV	Adjustment to decrease the length of the pipeline and provide better alignment for a river crossing
Wymer Run	9.5 to 9.8	WV	Adjustment to avoid a wetland and a cultural resource site
Life's Run	13.3 to 14.7	WV	Adjustment to reduce crossings of a known mussel stream
I-79 HDD	13.4 to 14.3	WV	Adjustment to I-79 crossing to accommodate I-79 HDD
Laurel Lick Road	18.4 to 18.8	WV	Adjustment to reduce tree clearing and reduce side slope construction
Buckhannon Run Road	19.2 to 20.1	WV	Adjustment to avoid a cultural resource site and to reduce tree clearing
Sago Road	29.5 to 30.0	WV	Adjustment to reduce the length of the pipeline and increase the distance of the pipeline from a residence and pond
Left Fork of French Creek Road	30.3 to 30.9	WV	Adjustment to reduce tree clearing
Queens Road	39.0 to 40.1	WV	Adjustment to avoid a wetland
Long Run M&R	47.1 to 47.4	WV	Adjustment to improve the approach into the Long Run M&R station
GWNF6 Route Adjustments - Blue Rock Knob/Round Knob	47.5 to 57.0	WV	Various adjustments to improve constructability, reduce tree clearing, and reduce side-slope crossings in mountainous terrain
GWNF6 Route Adjustments - Tallow Knob/Gibson Knob	69.0 to 74.0	WV	Various adjustments to improve constructability and reduce side-slope crossings in mountainous terrain, avoid impacts on the MNF, avoid karst features, and improve a stream crossing
Tallow Knob	70.1 to 70.5	WV	Adjustment to avoid an environmentally sensitive feature
Cloverlick	74.1 to 74.6	WV	Adjustment to avoid an environmentally sensitive feature
GWNF6 Route Adjustment - Greenbrier River	76.4 to 77.5	WV	Adjustment to improve crossing location of Greenbrier River
GWNF6 Route Adjustments - Allegheny Trail	77.5 to 79.0	WV	Various adjustments to improve constructability and reduce side-slope crossings in mountainous terrain, avoid a cemetery, and avoid cabins on the north side of Route 28
GWNF6 Route Adjustment - Thomas Creek	79.0 to 79.6	WV	Adjustment to improve crossing location of Thomas Creek
GWNF6 Route Adjustments - Michael Mountain/Sugar Camp Trail	79.6 to 84.7	WV/VA	Various adjustments to improve constructability and reduce side-slope crossings in mountainous terrain
Michael Mountain	*80.4 to 80.6*	*WV*	*Adjustment to avoid an environmentally sensitive feature*
GWNF6 Route Adjustment - Steep Pinch Ridge	*84.7 to 85.8*	*VA*	*Adjustment to improve constructability*
GWNF6 Route Adjustment - Back Creek	87.0 to 88.4	VA	Adjustment to avoid a wetland and increase distance from a historic school and home
GWNF6 Route Adjustment - Pine Mountain	88.5 to 89.4	VA	Adjustment to avoid an existing campground
GWNF6 Route Adjustment - Peak Run	89.6 to 90.5	VA	Adjustment to improve constructability and reduce side-slope crossings in mountainous terrain, square the route to steep slopes, and avoid impacts on a tower site
GWNF6 Route Adjustment - Singleton	91.9 to 92.7	VA	Adjustment to avoid a conservation easement
Poplar Hollow	*96.7 to 98.0*	*VA*	*Adjustment to reduce impacts on the GWNF and karst features, as well as to minimize the crossing of side-sloping topography. In addition, the adjustment has a significant reduction in length over the existing filed route*

TABLE 3.5-1 (cont'd)

Select Route Adjustments Incorporated into the Atlantic Coast Pipeline and Supply Header Project Routes

Route Adjustment	Approximate Mileposts	State	Rationale
GWNF6 Route Adjustments - Gibson Hollow/Deerfield Road	*99.2 to 101.8*	*VA*	*Various adjustments to improve constructability and reduce side-slope crossings in mountainous terrain*
GWNF6 Route Adjustment - Deerfield Well	108.2 to 109.6	VA	Adjustment to route further from the Deerfield Well.
GWNF6 Route Adjustment - Hunt Heart Fort Lane	110.0 to 111.0	VA	Adjustment to avoid crossing water pipelines
GWNF6 Route Adjustment - Bear Wallow Flat	111.6 to 112.2	VA	Route adjustment to address landowner request to avoid house site and address other issues
GWNF6 Route Adjustment - Hodges Draft	112.5 to 113.4	VA	Adjustment to increase distance from a residence and address a landowner request
GWNF6 Route Adjustment - Route 716	113.5 to 114.5	VA	Adjustment
Ramsey's Draft	114.2 to 115.3	VA	Adjustment to avoid a livestock/farm paddock operation. In addition, the adjustment has a significant reduction in length over the existing filed route
Braley Pond Road	*116.3 to 117.0*	*VA*	*Adjustment to optimize crossing of Calfpasture River*
Dryden Road	125.1 to 125.4	VA	Adjustment to avoid a septic field
Hangars Mill Road	128.1 to 128.8	VA	Adjustment to avoid a karst feature
Cochrans Mill Road	139.2 to 140.2	VA	Adjustment to avoid a cultural resource site and a cave
White Hill Road	140.8 to 141.6	VA	Adjustment to avoid a waterbody crossing
Churchmans Mill Road	141.5 to 142.6	VA	Adjustment to follow property boundaries
Christians Creek	141.6 to 142.6	VA	Adjustment to avoid a wetland
Wayne Avenue	145.2 to 146.6	VA	Adjustment to follow property boundaries
Cisco Lane	147.1 to 148.2	VA	Adjustment to follow property boundaries
Schages Lane	149.3 to 149.9	VA	Adjustment to increase collocation with road
China Clay Road	149.9 to 152.0	VA	Adjustment to optimize pipeline route
Hawkins Pond Lane	152.5 to 152.7	VA	Adjustment to avoid an environmentally sensitive feature
Orebank Creek	153.4 to 153.9	VA	The route in this area incorporated a previous route adjustment designed to avoid a cultural resource site. Subsequent evaluation of the site indicates it is not a historic property. For this reason, and as requested by the landowner, Atlantic proposes to shift to its previous alignment. In addition, the adjustment has a reduction in length over the existing filed route
Mount Torrey Road	155.4 to 156.0	VA	Adjustment to avoid a residence
Sherando Lake Road	156.5 to 157.6	VA	Adjustment to increase distance from residences
Mount Torrey Road	156.8 to 157.4	VA	Adjustment to accommodate an HDD pullback
Wintergreen Drive	158.7 to 159.2	VA	Adjustment to avoid road crossing
Beech Grove Road	158.9 to 159.1	VA	Adjustment to improve slope crossing
Bryant Mountain Road	160.0 to 160.7	VA	Adjustment to increase distance from residences and avoid road crossings
Winery Lane	160.9 to 161.4	VA	Adjustment to increase distance from residences
Horizons Village II	162.0 to 162.8	VA	Adjustment to avoid a seep at the Spruce Creek Conservation Site
Glenthorne Loop Road	163.1 to163.7	VA	Adjustment to minimize crossing of Bold Rock Cidery
Gullysville Lane	164.7 to 166.1	VA	Adjustment to reduce side-slope crossings
Stagebridge Road	170.0 to 171.6	VA	Adjustment to avoid a proposed building and address a landowner request
Stagebridge Road	170.1 to 170.8	VA	Adjustment to avoid structures, septic fields, wells, and springs
Starvale Lane	171.2 to 172.2	VA	Adjustment to reduce tree clearing
Laurel Road	174.2 to 176.9	VA	Adjustment to reduce side-slope crossings
Cabell Road	183.2 to 184.2	VA	Adjustment to avoid future home sites
Woodland Church Road	185.0 to 186.4	VA	Adjustment to reduce side-slope crossing

TABLE 3.5-1 (cont'd)

Select Route Adjustments Incorporated into the Atlantic Coast Pipeline and Supply Header Project Routes

Route Adjustment	Approximate Mileposts	State	Rationale
Warminister Church Road	188.0 to 189.9	VA	Adjustment to reduce tree clearing as requested by a landowner and to avoid a cultural resource site
Sycamore Creek Road	189.7 to 190.4	VA	Adjustment to meet a landowner request to avoid a family recreation site
Shelton Store Road	190.6 to 190.9	VA	Adjustment to meet a landowner request
Compressor Station 2	191.2 to 192.2	VA	Adjustment to connect to Compressor Station 2
Compressor Station 2	191.3 to 192.1	VA	Adjustment to optimize approach and exit from Compressor Station 2
Licky Branch	198.2 to 199.1	VA	Adjustment to avoid a waterbody crossing
Horsepen WMA	199.0 to 200.0	VA	Adjustment to avoid Horsepen WMA
Dixie Hill Road	200.5 to 201.7	VA	Adjustment to avoid a cultural resource site
Dixie Hill Road	201.3 to 201.6	VA	Adjustment to avoid haul roads and stabilized areas at the request of the landowner
Bucking B Ranch Lane	203.1 to 203.2	VA	Adjustment to avoid a haul road and stabilized areas at the request of the landowner
Rock Mill Road	203.5 to 204.6	VA	Adjustment to reduce the number of landowners crossed
Rock Mill Road II	203.5 to 204.6	VA	Adjustment to address a landowner request
Old Curdsville Road	208.1 to 209.0	VA	Adjustment to address a landowner request
Old Curdsville Road	208.6 to 208.9	VA	Adjustment to meet landowner request and follow the field edge
Little Willis River 1	209.0 to 209.4	VA	Adjustment to avoid two waterbody crossings
Little Willis River 2	209.8 to 210.0	VA	Adjustment to avoid two waterbody crossings
High View Road	209.5 to 210.3	VA	Adjustment to reduce wetland impacts
Raines Tavern Road	212.9 to 213.8	VA	Adjustment to avoid two waterbody crossings
River Road	219.9 to 220.4	VA	Adjustment to avoid a wetland
High Bridge Road	220.6 to 221.5	VA	Adjustment to reduce the number of landowners crossed
South Genito Road	226.5 to 227.0	VA	Adjustment to avoid a wetland
Dutchtown Road	228.3 to 228.5	VA	Adjustment to avoid a cemetery
Little Creek	230.3 to 231.1	VA	Adjustment to avoid a waterbody crossing
Deep Creek	235.9 to 237.0	VA	Adjustment to minimize a wetland crossing
Winningham Road	237.2 to 237.6	VA	Adjustment to improve a road crossing and reduce clearing of mature trees
Woody Creek	238.7 to 240.6	VA	Adjustment to minimize a wetland crossing
Piney Green	240.4 to 240.9	VA	Adjustment to avoid an environmentally sensitive feature
Watson Creek Road	241.3 to 241.8	VA	Adjustment to avoid multiple crossings of a waterbody
Cellar Creek Road	241.5 to 243.1	VA	Adjustment to avoid existing buried utilities
Cottage Road	243.1 to 244.9	VA	Adjustment to avoid a planned stream mitigation bank
Green Gable Road	245.8 to 246.4	VA	Adjustment to straighten and optimize the pipeline route
Colonial Trail Highway	246.6 to 247.4	VA	Adjustment to increase distance from residences
White Oak Road	253.9 to 254.5	VA	Adjustment to reduce the pipeline length
White Oak Road	254.0 to 254.6	VA	Adjustment to meet landowner request to move pipeline out of field and avoid an existing pond
Gills Bridge Road	259.7 to 261.5	VA	Adjustment to avoid a gem mine and house as requested by a landowner and to reduce crossings of cultural resource sites
Rawlings Road	264.0 to 264.7	VA	Adjustment to reduce tree clearing
Brunswick Powerline	267.1 to 279.5	VA	Various adjustments to improve collocation with the existing DVP electric transmission line
Columbia Gas Transmission	288.6 to 289.8	VA	Adjustment to increase collocation with existing natural gas transmission pipeline
Emporia Power Line	292.8 to 293.3	VA	Adjustment to minimize impacts on an environmentally sensitive feature
Skippers Road	293.5 to 294.8	VA	Adjustment to avoid a planned rock quarry

TABLE 3.5-1 (cont'd)

Select Route Adjustments Incorporated into the Atlantic Coast Pipeline and Supply Header Project Routes

Route Adjustment	Approximate Mileposts	State	Rationale
Taylors Mill Road	296.7 to 297.5	VA	Adjustment to minimize a wetland crossing
AP-2 Mainline			
Jacks Swamp	0.7 to 2.4	NC	Adjustment to minimize a wetland crossing
Hickory Tree Road	2.4 to 3.3	NC	Adjustment to reduce tree clearing
Big John Store Road	2.5 to 3.1	NC	Adjustment to avoid a cemetery
Big John Store Road	2.6 to 3.1	NC	Adjustment to avoid an environmentally sensitive feature and minimize impacts on forested land
Cornwallis Road	3.7 to 4.2	NC	Adjustment to avoid a wetland
Geenex Route	4.2 to 5.3	NC	Adjustment to increase collocation with an existing DVP 115kV electric transmission line by 0.6 mile
Highway 125	13.2 to 15.9	NC	Adjustment to avoid a proposed solar facility and future quarry site
Grapevine Road	14.5 to 15.4	NC	Adjustment to avoid a future quarry development
Halifax Airport Solar	16.0 to 17.0	NC	Adjustment to avoid a solar lease
Quankey Creek	16.0 to 17.3	NC	Adjustment to avoid a proposed future development by the Halifax Airport Authority
Jacket Swamp	26.9 to 27.7	NC	Adjustment to avoid a conservation easement
Massengale Road	40.0 to 40.3	NC	Adjustment to avoid a future home site development
Wollett Mill Road	42.2 to 42.4	NC	Adjustment to avoid a cemetery
Deans Road	42.6 to 43.2	NC	Adjustment to optimize route based upon field survey data
Cambridge Drive	48.8 to 49.1	NC	Adjustment to increase distance from residences
Bone Lane	53.0 to 53.2	NC	Adjustment to avoid an aboveground structure
West Homes Church Road	63.9 to 64.3	NC	Adjustment to avoid a cultural resource site
Boykin Road	70.5 to 70.8	NC	Adjustment to avoid a wetland
Healthy Plains Church	71.6 to 72.2	NC	Adjustment to avoid an identified dump site with unknown exposure
Contentnea Creek	73.1 to 74.4	NC	Adjustment to optimize creek crossing angle
Contentnea Creek	73.5 to 74.0	NC	Adjustment to the Contentnea Creek HDD alignment
Hales Road	80.1 to 81.5	NC	Adjustment to avoid a waterbody crossing and minimize a wetland crossing
Old Beulah Road	84.0 to 84.5	NC	Adjustment to avoid a wetland
Davis Homestead Road	84.5 to 84.8	NC	Adjustment to avoid a cultural resource site and reduce wetland impacts
Firetower Road	91.4 to 91.6	NC	Adjustment to avoid a cultural resource site
Yelverton Grove Road	92.3 to 93.3	NC	Adjustment to connect to Smithfield M&R Station
Smithfield M&R	92.6 to 92.7	NC	Adjustment to improve approach to Smithfield M&R Station
Neuse River	98.0 to 99.0	NC	Adjustment to avoid an environmentally sensitive feature
Hannah Creek	100.9 to 101.3	NC	Adjustment to minimize impacts on an environmentally sensitive feature
Coats Road	103.5 to 103.8	NC	Adjustment to address a landowner request
NC-50 South	109.5 to 110.0	NC	Adjustment to avoid a wetland
Godwin Lake Road	110.1 to 110.7	NC	Adjustment to avoid a blueberry farm
Holly Grove Road	112.4 to 112.7	NC	Adjustment to avoid a wetland
Holly Grove Road	112.4 to 112.8	NC	Adjustment to reduce tree clearing
NC DOT Easement	113.9 to 114.4	NC	Adjustment to avoid a North Carolina Department of Transportation Nutrient Easement
Green Path Road	117.8 to 118.2	NC	Adjustment to reduce wetland impacts
Godwin Falcon Road	126.2 to 126.8	NC	Adjustment to reduce the pipeline length
Dunn Road	128.3 to 128.4	NC	Adjustment to improve a railroad crossing
Sisk Culbreth Road	129.4 to 129.7	NC	Adjustment to avoid existing structures

TABLE 3.5-1 (cont'd)

Select Route Adjustments Incorporated into the Atlantic Coast Pipeline and Supply Header Project Routes

Route Adjustment	Approximate Mileposts	State	Rationale
Cape Fear River	130.3 to 131.2	NC	Adjustment to avoid an environmentally sensitive feature and increase collocation with an existing utility corridor. In addition, the adjustment has a reduction in length over the existing filed route
Jackie Lee Road	133.8 to 134.2	NC	Adjustment to reduce the pipeline length
Johnson Road	150.6 to 151.0	NC	Adjustment to avoid a solar facility
Duke Crossover 1	151.6 to 152.1	NC	Adjustment to avoid a large ditch
Duke Crossover 2	154.4 to 154.8	NC	Adjustment to comply with Duke Energy's right-of-way use guidelines
Chickenfoot Road	159.2 to 159.4	NC	Adjustment to comply with Duke Energy's right-of-way use guidelines
Little Marsh Swamp	162.0 to 164.8	NC	Adjustment to minimize a wetland crossing and parallel an existing utility corridor
Pin Oak Drive	165.9 to 167.2	NC	Adjustment to avoid a federally listed plant species
Great Marsh Church	168.3 to 169.3	NC	Adjustment to meet a landowner request
West Great Marsh Church Road	168.4 to 168.9	NC	Adjustment to avoid a cultural resource site
Rennert Road	171.5 to 172.3	NC	Adjustment to reduce the length of the pipeline and address a landowner request
Rennert Road	171.7 to 171.9	NC	Adjustment to optimize crossing of existing electric transmission line and avoid existing structure
McQueen Road	175.0 to 175.4	NC	Adjustment to avoid a wetland
Borrow Site	176.8 to 177.7	NC	Adjustment for a future borrow site
Evergreen Church Road	178.2 to 178.7	NC	Adjustment to follow a property boundary
Whistling Rufus Road	181.1 to 181.8	NC	Adjustment to reduce tree clearing
AP-3 Lateral			
Highway 186	9.9 to 10.3	NC	Adjustment to reduce tree clearing and optimize a railroad crossing
Hugo Road	13.3 to 13.5	VA	Adjustment to optimize a railroad crossing
DVP Electric Transmission Line	14.6 to 22.3	VA	Adjustment to improve collocation with the existing DVP electric transmission line
Cross Keys Road	20.5 to 21.5	VA	Adjustment to increase collocation with existing utility corridor
Newsome	22.5 to 23.0	VA	Adjustment to optimize route based upon field survey data
Grays Shop Road	23.7 to 24.1	VA	Adjustment to avoid a wetland
Thomaston Road	25.7 to 26.7	VA	Adjustment to reduce tree clearing and increase collocation with an existing linear utility corridor
Cypress Bridge Road	26.9 to 27.4	VA	Adjustment to follow a field edge per landowner request
Bishop Poquoson Road	28.6 to 28.9	VA	Adjustment to avoid a wetland
Sycamore Church Road	33.9 to 34.9	VA	Adjustment to follow property boundary
Highway 58	41.1 to 41.5	VA	Adjustment to address a landowner request
Elwood Road	42.8 to 45.9	VA	Adjustment to reduce tree clearing, increase collocation with an existing linear utility corridor, and reduce wetland impacts
Franklin	44.4 to 45.5	VA	Adjustment to avoid a conservation easement
OKelly drive	46.5 to 46.7	VA	Adjustment to optimize route based upon field survey data
Longstreet Lane	47.6 to 48.8	VA	Adjustment to improve collocation with an existing electric transmission line
Pioneer Road	49.3 to 50.4	VA	Adjustment to reduce the pipeline length and optimize a railroad crossing
Holland Road	50.8 to 51.6	VA	Adjustment to meet a landowner request
Pruden Boulevard	59.0 to 59.3	VA	Adjustment to avoid a future church
Deer Path Road	52.8 to 53.9	VA	Adjustment to avoid a planned rail yard and wildlife area at the request of the landowner

TABLE 3.5-1 (cont'd)

Select Route Adjustments Incorporated into the Atlantic Coast Pipeline and Supply Header Project Routes

Route Adjustment	Approximate Mileposts	State	Rationale
Deer Path Road	53.5 to 54.3	VA	Adjustment to avoid proposed future wildlife refuge
Kings Fork Road	55.6 to 55.9	VA	Adjustment to reduce tree clearing
Lake Point Road	59.0 to 60.2	VA	Adjustment to avoid a proposed future development
Lake Prince	60.6 to 61.4	VA	Adjustment to improve HDD crossing location
Godwin Boulevard	63.1 to 63.5	VA	Adjustment to improve a road crossing
Nansemond River	64.2 to 65.1	VA	Adjustment to improved crossing angle of Nansemond River
Nansemon Pullback	65.1 to 65.4	VA	Adjustment to avoid a tidal wetland
Nansemond Parkway	66.4 to 69.0	VA	Adjustment to reduce tree clearing and increase collocation with an existing linear utility corridor
Gateway	71.0 to 72.7	VA	Adjustment to avoid a wetland mitigation bank and mitigation site; includes the new Route 58 HDD. In addition, the adjustment has a significant reduction in length over the existing filed route
East Ditch	71.2 to 71.8	VA	Adjustment to minimize impacts on a salvage yard business. In addition, the adjustment has a reduction in length over the existing filed route
West Military Highway	71.3 to 71.8	VA	Adjustment to optimize crossing of West Military Highway and avoid Federal land crossing
Truitt Road	73.0 to 73.6	VA	Adjustment to optimize route based upon field survey data
Norfolk Western Railroad	76.0 to 76.1	VA	Adjustment to optimize a railroad crossing
Norfolk Southern	76.0 to 76.8	VA	Adjustment to avoid an environmentally sensitive feature
Galberry Road	77.5 to 77.9	VA	Adjustment to improve collocation with an existing electric transmission line
West Military Highway	68.0 to 68.4	VA	Adjustment to optimize crossing of West Military Highway and auto salvage yard
Hampton Roads Beltway	77.6 to 79.5	VA	Adjustment to optimize collocation with an existing linear utility corridor
Forest Cove Drive	79.7 to 80.3	VA	Adjustment to optimize collocation near existing electric transmission substation
South Military Highway	81.2 to 82.1	VA	Adjustment to optimize pipeline location near existing industrial facility and optimize crossing of South Branch Elizabeth River
AP-4 Lateral			
Governor Harrison Parkway	0.0 to 0.3	VA	Adjustment to improve connection to proposed electric generation facility
AP-5 Lateral			
Rogers Road	0.5 to 1.0	VA	Adjustment to improve connection to proposed electric generation facility
SUPPLY HEADER PROJECT			
TL-635			
Broad Run Road	21.2 to 21.9	WV	Adjustment to avoid side-slope workspace
Bates Run	29.7 to 29.8	WV	Adjustment to optimize crossing of South Fork Fishing Creek
Upper Run	31.0 to 31.8	WV	Adjustment to reduce side slope crossing
TL-636			
Hills Church Road	3.6 to 3.9	PA	Adjustment to reduce tree clearing and increase collocation

Note: Route adjustments in italics are located on NFS Lands.

3.6.1.3 ACP Compressor Station 2

Atlantic considered two sites for Compressor Station 2 in Buckingham County, Virginia; the currently proposed site and an alternative site located 1.9 miles to the southwest of the proposed site near the intersection of Midland Road and the existing Transco pipeline system. We received several comments that the operation of Compressor Station 2 would degrade air quality and impact residence around the proposed facility, and that an alternate site should be considered. We also received comments that the proposed location of Compressor Station 2 would affect the Norwood – Wingina and Warminster Historic Districts and the Yogaville Ashram. Thus, we evaluated the Midland Road site as a possible alternative. Figure 3.6.1-1 depicts the location of the proposed and alternate sites. A comparison of the environmental data on each site is provided in table 3.6.1-1.

TABLE 3.6.1-1

Comparison of Proposed Site and Midland Road Alternative Site for Compressor Station 2

Features	Unit	Proposed Site	Midland Road Site Alternative
Permanent easement	acres	12.9	13.1
Temporary construction workspace	acres	56.0	55.8
Additional miles of AP-1 mainline required	miles	0.0	1.1
Conservation easements	acres	0.0	0.0
Forested lands – Permanent	acres	12.8	10.6
Forested lands – Temporary	acres	36.1	38.8
Wetlands (NWI) – Permanent	acres	0.0	0.0
Wetlands (NWI) – Temporary	acres	0.0	0.0
Intermittent waterbodies	number	1	0
Perennial waterbodies	number	0	0
Prime Farmland – Permanent	acres	11.5	3.6
Prime Farmland – Temporary	acres	26.7	30.1
Noise Sensitive Areas (NSA) within 0.5 mile	number	9	10

The environmental impacts between the proposed site and the Midland Road Alternate site are similar; however, the alternative site would require additional pipeline and would increase the construction footprint of ACP. Further, our analysis in sections 4.9.9.1 and 4.11.1.3 concludes that operation of the compressor stations would not cause or contribute to a violation of the federal air quality standards; therefore, we do not believe health would be adversely affected or that the alternative site would be necessary for reasons of air quality or public health. Also, the Norwood – Wingina and Warminster Historic Districts are 4.5 and 5.9 miles from the proposed compressor station site, respectively, and the Yogaville Ashram is over 4.5 miles from the site. Therefore, these areas would not be affected by construction or operation of the facility, and moving the compressor station 1.9 miles to the southwest would not provide and measurable benefit. Considering these factors, we conclude that the Midland Road Alternative compressor station site does not offer a significant advantage, and we do not recommend it.

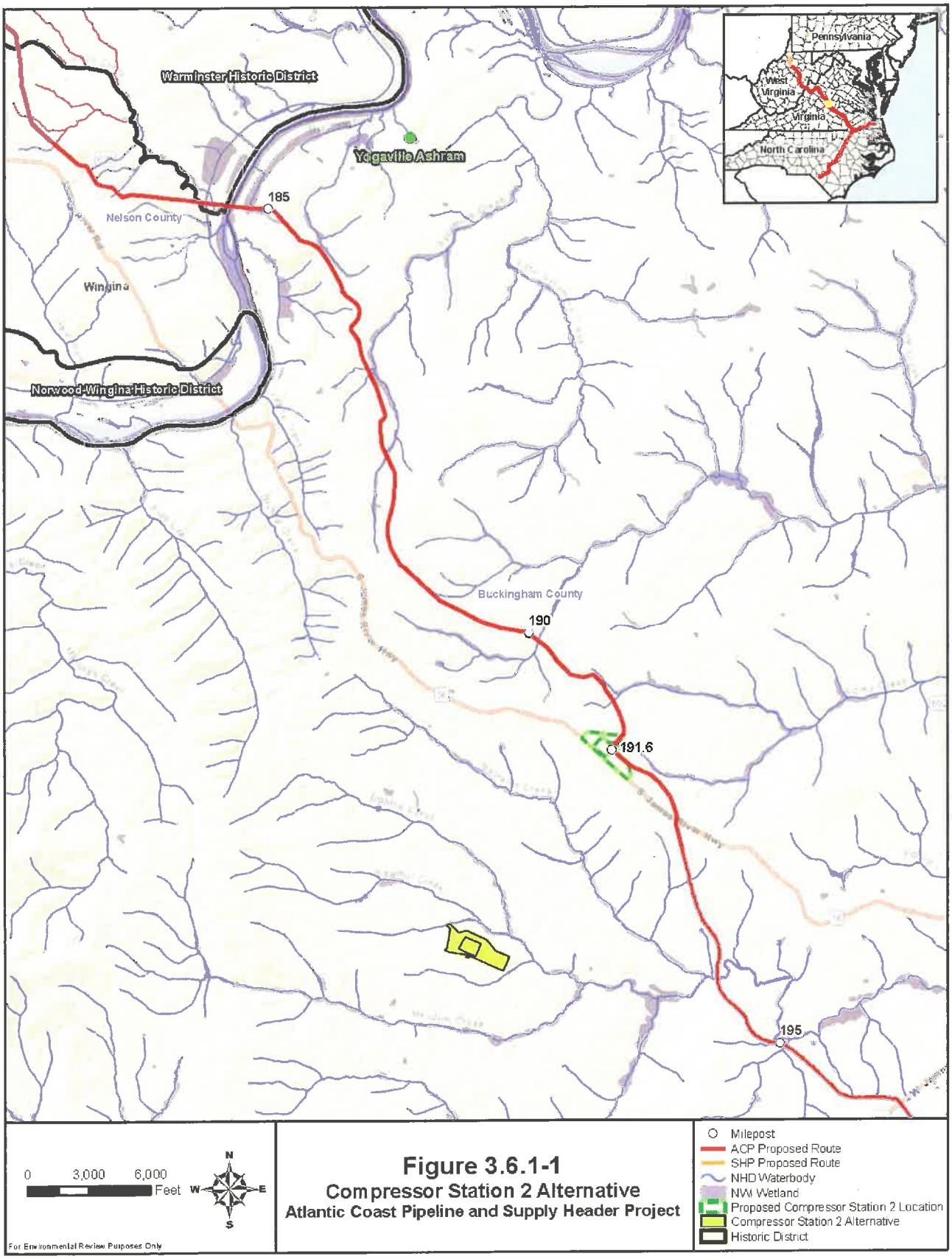

Figure 3.6.1-1
Compressor Station 2 Alternative
Atlantic Coast Pipeline and Supply Header Project

3.6.1.4 ACP Compressor Station 3

We did not receive any comments regarding alternative sites for Compressor Station 3. Based on our evaluation of the proposed site in section 4 of this EIS, we find it to be an acceptable location, and that the compressor station would not result in or contribute to significant environmental impacts. As such, no alternative sites were evaluated.

3.6.1.5 Electric-Driven Compressor Alternatives

Based on commentors concern regarding the need to reduce air emissions, we evaluated the feasibility of using electric motor-driven compressors as an alternative to the natural gas-driven compressors proposed for ACP. The electric power needed to run the electric-driven compressor units at Compressor Stations 1, 2, and 3 would be 32 MW, 28 MW, and 12 MW, respectively. To supply the electric power at each facility, an overhead single phase power line would need to be constructed to each compressor station. Based on the location of existing power lines near the proposed facilities, about 9.5 miles, 12 miles, and 3.5 miles of power lines would need to be constructed to Compressor Stations 1, 2, and 3, respectively. The local electric distribution companies that construct the power lines may also be required to construct 1- to 2-acre substations for each power line facility. This additional electric infrastructure would increase environmental impacts and impact landowners currently unaffected by ACP.

Use of electric-driven compressors, from the perspective of meeting Atlantic's emissions, was not considered environmentally superior to natural gas compressors in terms of reducing regional emissions. Although local air emissions from electric-driven compressors would be lower than those from natural gas-driven compressors, use of electric-driven compressors would result in a higher load on the electric power grid and higher emissions from the electric power generating stations. Additionally, the use of natural gas-driven compressors provides reliable, uninterrupted natural gas transmission because the fuel is continually supplied by the pipeline facility and would not be affected by an electrical outage at the compressor station. Considering these factors, we conclude that electric-driven compressor units would not offer a significant environmental advantage over the proposed gas-driven compressors.

3.6.2 Meter Stations and Valves

We did not evaluate alternative locations for M&R stations because their locations are largely determined by interconnections with other pipeline systems and delivery points, the facilities have a relatively small footprint, and we did not receive any alternative meter station site recommendations from stakeholders. Similarly, we did not evaluate alternative locations for valves because the locations of these facilities are based in part on PHMSA regulations, the facilities have a relatively small footprint, and we did not receive any alternative valve site recommendations from stakeholders.

3.6.3 Communication Towers

We did not evaluate alternative locations for communication towers because their locations are largely determined by the location of other proposed or existing aboveground facilities, the facilities have a relatively small footprint, and we did not receive any alternative site recommendations from stakeholders.